Micro-exporters and productivity: revisiting the self-selection effect, the learning by exporting effect and the exporter premium

Doctoral dissertation submitted to the Faculty of Economics and Business for the degree of PhD in Economics and Business at the Autonomous University of Madrid

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To my parents

A mis padres

- *There is a little boy and on his fourteenth birthday he gets a horse and everybody in the village says, “how wonderful, the boy got a horse”.*

  And the Zen master says, “we will see”.

  Two years later, the boy falls off the horse, breaks his leg, and everyone in the village says, “how terrible”.

  And the Zen master says, “we will see”.

  Then, a war breaks out and all the young men have to go off and fight. Except the boy cannot because his legs are all messed up, and everybody in the village says, “how wonderful”.

- *Now the Zen master says, “we will see”.*

- *So, you get it?*

- *No, no, no.*

Charlie Wilson's War (2007), dialogue between the characters Gust Avrakotos and Charlie Wilson

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Short summary

International trade literature suggest that exporters are, in reality, a minority of firms with good performance characteristics. Exporters, on average, are larger, more innovative and more capital intensive. Moreover, they pay higher wages and are more productive than non-exporters. Therefore exporters are winners.

This superior performance of exporters to non-exporters, known as the exporter premium, has two possible but non-mutually exclusive explanations. Firstly, given the high export entry costs to access the foreign market only the most productive firms find it profitable to absorb the entry costs so there is an ex-ante selection process of the most productive firms before starting to export, known as the self-selection effect. Secondly, export activity exposes firms to new knowledge and technology used by foreign buyers and competitors. If exporters absorb and implement this new knowledge and technology starting to export boosts the productivity of firms through a beneficial ex-post effect known as the learning by exporting effect. Theoretical and empirical literature strongly supports the existence of the self-selection effect and the exporter premium while conclusions about the learning by exporting effect are not clear yet. At any rate, international trade literature widely supports the concept that exporters are better than non-exporters.

Nonetheless, there are several export dynamics which are inconsistent with the existence of high export entry costs and the self-selection effect. These includes the low amount exported and the high export turnover in and out of the foreign market which is experienced by many exporters. More recent investigations concede that firms consciously adopt export entry strategies to lower the export entry cost in order that the entry cost is no longer fixed and exogenously determined but variable and endogenously determined by the firm, thus explaining these new export dynamics.

This thesis proposes and proves that inconsistencies in international trade literature are caused by sampling biases in the firm-level national statistical databases employed by the literature which overrepresent large firms that become large exporters. This thesis also presents a conceptual export entry framework for small firms with low productivity and scarce resources to access the export market where they select export entry strategies which minimize the export entry cost to be able to export but become micro-exporters who are neither subject to the self-selection effect nor the learning by exporting effect and, consequently, nor the exporter premium.

With an unbalanced panel of more than 1,800 Spanish manufacturing firms per year during the period 1990-2015 this thesis validates that small firms with low productivity and scarce resources become micro-exporters by exporting their existing products to gravitational markets through distributors more often than large exporters and validates with descriptive analyses, regression tests and non-parametric tests the hypotheses that micro-exporters are no more productive than non-exporters before starting to export, that they do not experience faster productivity growths after starting to export and, henceforth, that micro-exporters are no more productive than non-exporters.

The implications of these findings for business strategy and economic policy are very important. Since an ample proportion of the export community are micro-exporters for which the export entry cost is no longer a major obstacle to internationalization, the focus of decision makers and export promotion programs must shift from how to access the export market to how to learn and benefit from the export activity. Otherwise, small firms will be sidetracked by globalization.

Resumen breve

La literatura de comercio internacional sostiene que las empresas exportadoras son solo una minoría de compañías muy eficientes. Las empresas exportadoras, de media, son más grandes, más innovadoras, más intensivas en capital, pagan mejores salarios y son más productivas que las empresas no exportadoras. Por ello se dice que las empresas exportadoras son empresas ganadoras.

Esta superioridad de las empresas exportadoras sobre las no exportadores, conocida como prima del exportador, tiene dos posibles explicaciones no excluyentes entre sí. En primer lugar, dado que existen altos costes para acceder al mercado internacional, solo las empresas más productivas encuentran rentable absorber los altos costes de entrada, generando un proceso previo de selección de las empresas más productivas hacia a la exportación llamado efecto autoselección. En segundo lugar, la actividad exportadora expone a las empresas a nuevo conocimiento y tecnología de los clientes y competidores internacionales. Cuando los exportadores adquieren e implementan este conocimiento y tecnología, el inicio de la actividad exportadora impulsa la productividad de las empresas a través de un efecto benéfico a posteriori llamado efecto aprendizaje por exportación. La literatura teórica y empírica apoya firmemente la existencia del efecto autoselección y de la prima del exportador, mientras que los resultados sobre el efecto aprendizaje por exportación aún no son concluyentes. En cualquier caso, la literatura de comercio internacional apoya ampliamente la idea de que las empresas exportadoras son mejores que las empresas no exportadoras.

Sin embargo, existen algunas dinámicas de exportación que no son consistentes con la existencia de altos costes de entrada y con el efecto autoselección, como el bajo valor exportado y la alta rotación de entrada y salida al mercado internacional que experimentan muchos exportadores. Las investigaciones más recientes sugieren que las empresas conscientemente adoptan estrategias de inicio a la exportación que reducen los costes de entrada de forma que estos costes ya no son fijos ni exógenamente determinados, sino que se vuelven costes variables endógenamente decididos por la empresa, lo que permite explicar estas nuevas dinámicas de exportación.

La tesis propone y demuestra que estas inconsistencias en la literatura de comercio internacional se deben a sesgos de muestreo en las bases de datos de estadísticas nacionales de empresas que son empleadas por la literatura académica en las cuales las grandes empresas que tienden a ser

grandes exportadores están sobrerrepresentadas. La tesis también presenta un marco conceptual de inicio a la exportación para las pequeñas empresas de baja productividad y pocos recursos donde estas empresas seleccionan estrategias de entrada a la exportación que minimizan el coste de entrada para poder exportar pero que las convierte en empresas micro-exportadoras que no están sujetas al efecto autoselección, ni al efecto aprendizaje por exportación ni, consecuentemente, a la prima del exportador.

Con datos panel de unas 1,800 empresas industriales españolas al año para el periodo 1990-2015, la tesis valida el marco conceptual por el que las empresas pequeñas de baja productividad y pocos recursos se convierten en micro-exportadores exportando a mercados gravitacionales productos que ya venden en el mercado doméstico a través de intermediarios con mucha más frecuencia que los grandes exportadores. Y a través de análisis descriptivos, test de regresión y test no paramétricos la tesis valida las hipótesis de que las empresas micro-exportadoras no son más productivas que las empresas no exportadoras antes de iniciar la exportación, ni experimentan crecimientos más rápidos de su productividad una vez iniciada la exportación y, por lo tanto, que las empresas micro-exportadoras no son más productivas que las empresas no exportadoras.

La trascendencia de estos resultados para la estrategia empresarial y la política económica son importantes. Puesto que un gran porcentaje de la comunidad exportadora está compuesto de micro-exportadores para los que el coste de acceso al mercado de exportación ya no es un obstáculo de primer orden, la atención de los tomadores de decisiones y de los programas de apoyo a la exportación deben reorientarse desde cómo entrar al mercado de exportación hacia cómo aprender y beneficiarse de la actividad exportadora. De lo contrario, las pequeñas empresas no se verán beneficiadas por la globalización.

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Furthermore, I need to extend my gratitude towards ICEX, the Spanish Institute for Foreign Trade, for granting me access to the Profile of the Spanish Exporting Company database from where I obtained all the data regarding the situation of micro-exporters in Spain. As well as the SEPI Foundation for granting me access to the Survey on Business Strategies database which I use as the longitudinal firm-level panel dataset to perform the statistical tests.

Moreover, I cannot forget all the people that supported me during this three-year process. First of all, I want to tribute this thesis to my grandmother Mrs. Pilar García who died on 15th August 2018 at the age of 100. To my matriarch goes all the merit to raise in postwar Spain a family of seven where the second generation became professionals and the third generation is given the luxury to study a PhD out of sheer curiosity.

A generation goes and a generation comes and the fourth generation, as a prophetic sign, has arrived during the elaboration of this thesis for whom I have the greatest expectations. I have no doubt that Alejandra and Vega will greatly exceed them.

Specially, I would like to acknowledge my parents, Mrs. Pilar Guerra and Mr. Eduardo Guerra, for always believing in me and giving me encouragement along the way, as well as my sister Mrs. Ursula Guerra. Finally, I want to thank everybody that has shared with me these three years of my life and the Foundation Agriterra for giving me the chance to do what I love the most. To think.

INTRODUCTION

1. Motivation for this thesis

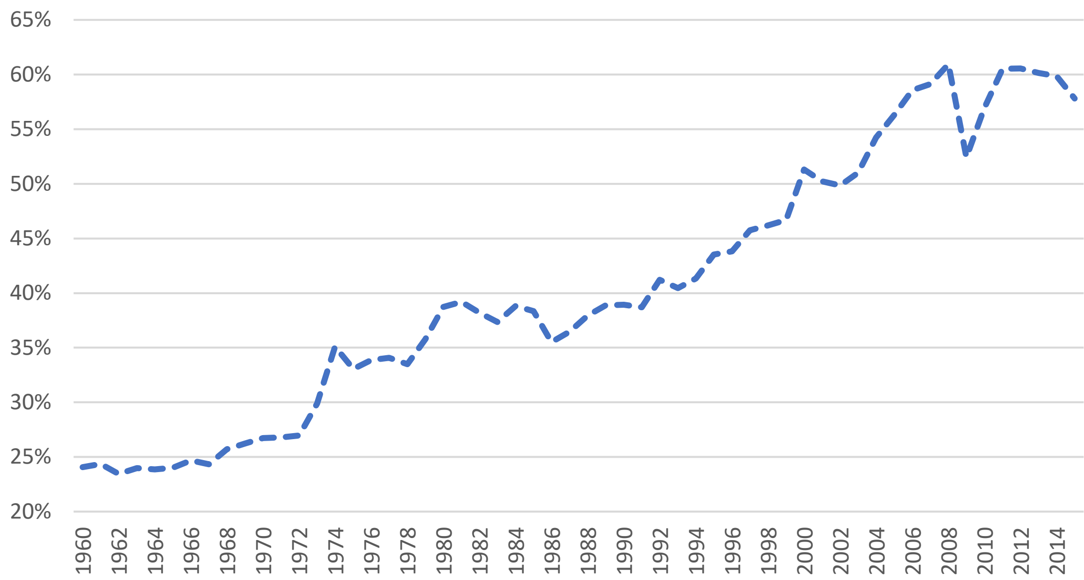
I still remember when, as a freshman, I took my first class of International Economics with the professor Mr. Candido Pañeda to whom I will always be indebted to him for introducing the international trade theories to me. That very first day he taught us how trade can be explained by the existence of Adam Smith´s absolute advantage and David Ricardo´s comparative advantage and how international trade could positively benefit the lives of billions of people around the world, spurring in me a great interest for international trade.

At that time globalization was in full swing and international trade theory was growing in importance as a field of study due to the rapid integration of national markets as one single worldwide market. One day after coming home from my lessons, my parents asked me if I could explain to them what all the fuss about the Internet and globalization was about. I did not know much about the Internet but I gave them an anecdotical example that I had read in a textbook explaining the soaring importance of international trade and globalization in our daily lives, which I retell here. According to Feenstra (1998), citing an article from *Los Angeles Times* by Tempest (1996), in order to produce a Barbie doll, the multinational company Mattel sources plastic and hair from Taiwan and Japan which employs Saudi oil. The mold, paints and packaging come from the United States (US), the cotton clothing from China, the final assembly takes places in factories in China, Indonesia and Malaysia and exports are done from Hong Kong (at the time a British overseas territory). I explained to them that although globalization is a much broader phenomenon, the economic aspect of globalization is certainly the most pervasive as in the last decades, at least for most of the countries, consumers can easily acquire goods and services from all over the world and domestic firms can expand their operations by selling or investing abroad.

One better way to highlight the rising importance of international trade is to look at the growth of the share of traded goods and services in relation to the size of the world economy in the last 55 years. According to the statistics taken from the World Bank (WB) figure 1 shows the world trade of goods and services as a percentage of the world gross domestic product (GDP), with a steady increase in international trade as a share of the size of the world economy over the period 1960 to 2015. International trade grew from 24 percent of the world GDP in 1960 to over 58 percent by

2015, quickly rising in absolute and relative terms. With the latest data available, the share of world trade grew to reach in 2017 an all-time high of 71 percent.

Figure 1. International trade as percentage of world GDP, period 1960-2015



Source: Own elaboration with data from the WB national accounts database. Aggregation method by weighted average. Trade is the sum of exports and imports of goods and services measured as a share of GDP.

Hungry to better understand the multifaceted aspects of international economics and eager to explore the world, as a sophomore I disclosed to my parents my master plan to complement my studies abroad by applying to several scholarships that luckily financed my studies in Latin America (Mexico), the Middle East (Turkey) and Europe (Malta) and allowed me to visit neighboring countries, but which cost my parents more than one or two sleepless night as well as some watery eyes. Nevertheless, during these years abroad my resolution of pursuing my studies further on international economics and especially on international trade deepened and my next step came smoothly when I finished my economics degree. After my first try-out I was admitted by the *Instituto Español de Comercio Exterior* (ICEX), the Spanish Institute for Foreign Trade, to study (most likely) the best postgraduate degree in Business Internationalization in Spain. A three-year program which allowed me to study in Madrid a one-year syllabus based on international operations and at the end of the year gain experience with an internship as an export manager. A second year working as a trade advisor at the Economic and Commercial Office of the Embassy of Spain in Ho Chi Minh City (Vietnam) where I learn from the very best, Mr. Carlos Domínguez Agulleiro, how to assist Spanish firms to export to and outsource from the Southeast Asian country by providing specialized advice, market intelligence, business agendas and coordinating trade fairs and investment forums. And a final third year where I was hired by a Spanish multinational to work in Australia as an international business development manager in the railways industry.

After the three-year program I was more than ready to take on any international opportunity and I decided to join a Dutch non-profit organization as a business advisor in Bolivia to assist farmers to develop their agricultural organizations. Almost at the same time I started my Doctor of Philosophy (PhD) program in economics. This has proven to be a very interesting decision because my thesis nurtured from my field experience in Bolivia and my work with farmers evolved with my findings in international trade.

Four hours from the city of La Paz, the *de facto* capital of Bolivia, after hitting a summit of 4,600 meters high and descending the famous Death Road you reach the Yungas, a tropical region famous for its coffee production. The first time I worked in Yungas I was surprised to discover that in this very poor region the small and unproductive farmers' organizations, which also lack internal resources, were able to export their tiny coffee batches, contradicting the common knowledge that the internationalization of a firm is a difficult process which requires great ability and commitment of internal resources and that only firms with good performance characteristics are able to export. With this contradiction in the back of my mind I started to mull over it and I saw a great opportunity to develop my PhD thesis in trying to explain this ostensible incoherence between the existence of these inefficient firms with poor performance characteristics, which I have come to call micro-exporters, and their ability to export tiny amounts.

To my surprise I discovered that these firms are able to export because they develop two export entry strategies. Firstly, an export entry strategy based on the principle of minimum effort, that is, to export coffee beans to Chile through an international distributor. Secondly, an export entry strategy based on value added generation subsidized by development aid programs, that is, exporting certified organic coffee to Europe with the support of non-governmental organizations (NGO), such as the Dutch foundation where I am working. With this evidence I concluded that there is a common link: the first strategy reduces the export entry cost and the second strategy subsidizes it. In both cases the firms in Yungas do not wait to improve their performance characteristics to start exporting but rather prefer to minimize the export entry cost and the required internal resources to start exporting contradicting, to some extent, the common knowledge about exporters.

Since I was living and working in Bolivia, a country without a single PhD program related to International Economics at the time, I really had to present an eye-catching research proposal to be accepted by a reputable university into a quality PhD program as an overseas student. With no time to waste I got to work, starting by selecting the trade theory which better fitted my inquiry. First of all, I discarded the Heckscher-Ohlin trade theory based on factor endowments and comparative advantage, created by the Swedish economist Eli Heckscher (1919) and further developed by his student Bertil Ohlin (1933) as they use as the subject of study countries rather than firms. I also had to reject the New Trade Theory (NTT) developed by Paul Krugman during the late 1970s and the early 1980s (Krugman, 1979; Krugman, 1980; Krugman, 1981) as it abstracts the subject of study to employ model firms rather than allowing for the great heterogeneity that exists among them, specifically the ample differences in firm's internal resources and productivity. Finally, I discovered the New New Trade Theory (NNTT) initiated by Bernard and Jensen (1995) and I had (almost) an instant infatuation. Not only the NNTT models the heterogeneous nature of firms in size, productivity and many other characteristics which are the foundations of my research proposal on micro-exporters. NNTT is also considered superior to all previous trade theories in the sense that it incorporates comparative advantage (Bernard et al., 2003) and many of the features from the NTT such as the constant elasticity of substitution (CES) demand and the monopolistic competition (Melitz, 2003), subsuming all previous theories and producing more accurate (realistic) predictions. On top of that, at the time of writing this thesis the NNTT literature represents the vanguard of international trade theory. I could not ask for more as the NNTT theory provided me the required theoretical and empirical framework that I was looking for.

That is how I took the challenge to examine under the NNTT methodology the reality of micro-exporters. However, I faced an important problem as the extraordinary volume of firm-level data required by the NNTT testing methods is not yet available in Bolivia and, additionally, the existing statistical databases in Bolivia are relatively unreliable. My solution was to travel back, statistically speaking, to my country of origin, Spain, to test my ideas about micro-exporters. At any rate, if my ideas about micro-exporters were right they should hold no matter the country of study (Hamermesh, 2007).

To my surprise, when I accessed the Spanish database *Perfil de la Empresa Exportadora Española*, the Profile of the Spanish Exporting Company from ICEX, a database that contains all the officially registered exporters per year in Spain since the year 2000, I found that around half of all Spanish exporting firms export no more than Eur 25,000/year and about 2/3 export no more than Eur 50,000/year. More importantly, over the last 15 years micro-exporters have been increasing in importance in absolute and relative terms among the Spanish exporting community, reaching a point when ICEX alerted about the soaring importance of micro-exporters in bold red letters before accessing the database. Spain, a priori, appeared to be the perfect hotbed for my thesis.

Since then, the next three years of work and study culminated in this thesis which I consider is only the tip of the iceberg from the amount of pages written, as I have the neurotic mania to write 10 pages and keep 10 lines, to end up rewriting those same 10 lines into something new.

2. Justification, objectives and contribution

The NNTT literature is quite recent as in the 1990's national statistical offices started to collect and release rich and detailed plant-level datasets which allowed the emergence of this literature based on dynamic models of firm entry, growth and exit which explain the tight link between firm dynamics, productivity and trade. These new available firm-level databases piqued the interest of economists involved in international trade who suggest that trade is performed by individual firms and not by countries or industries, that firms are heterogeneous and that the representative firm is a myth. That is why they propose the singularity of a firm as the subject of study in the economic analysis of international trade patterns.

The NNTT, which will soon celebrate its silver jubilee (25th anniversary), was started by the seminal paper of Bernard and Jensen (1995) where they tested if the common knowledge that exporters have better performance characteristics than non-exporters is true. They confirmed the superiority of US exporters to non-exporters in terms of capital intensity, sales, size, wages and labor productivity, a difference in performance between exporters and non-exporters that they termed as the exporter premium (Bernard and Jensen, 1995). Following the lead of Bernard and Jensen (1995) in just a few years many empirical papers documented the existence of the exporter premium in many other countries such as Germany (Bernard and Wagner, 1997); Colombia, Mexico and Morocco (Clerides et al., 1998); China (Kraay, 1999); South Korea and Taiwan (Aw et al., 2000); Italy (Castellani, 2002); and Spain (Delgado et al., 2002). To name a few. It seems that exporters are better than non-exporters. Since then, this microeconomic/micro-econometric literature has exploded indicating that this approach to study international trade is a fertile ground for economist (Wagner, 2016).

Soon the theoretical framework which allows to explain the existence of the exporter premium was given by Melitz (2003), who proposed a theoretical model by which only the most productive firms self-select into the export market given the existence of high export entry costs. A model which has been widely replicated through adaptations and extensions such as Helpman et al., 2004; Chaney, 2008; Albornoz et al., 2012; and Ruhl and Willis, 2017, among others. The existence of high export entry costs such as setting up a new distribution network, establishing an after-sale service, creating brand awareness and adapting the product to foreign health and safety regulations (Baldwin, 1988) increase the productivity entry threshold into exports, because firms only enter the foreign market if the expectations of future profits from exporting cover the entry cost (Melitz, 2003). Over this productivity entry threshold firms enter and remain in the export market creating a self-selection (SS) effect by which exporters are more productive than non-exporters before starting to export, since only the most productive firms self-select into exports. Below this productivity entry threshold firms do not enter or exit the international market. In Melitz (2003) model it is firms' productivity heterogeneity, which allows to explain why so many firms only produce for the domestic market (non-exporters) while the more productive ones, a minority, also export (exporters). Endowed with a robust theoretical scaffolding, additionally, the SS hypothesis has also been thoroughly tested by the NNTT empirical literature reaching a general consensus on the existence of the SS effect (Wagner 2007; ISGEP, 2008; Wagner, 2012). It seems that only the most productive firms enter the export market.

An alternative, but not mutually exclusive hypothesis to the SS effect, has been proposed by the NNTT literature to explain the existence of the exporter premium. When firms compete in the international market they are exposed to new knowledge and technology through the interaction with international buyers and competitors (Evenson and Westphal, 1995; Castellani, 2002; Czinkota et al., 2010; Bai et al., 2017). If exporters are able to absorb and implement this new knowledge and technology by learning from the international market, starting to export will boost firms' productivity through a beneficial post-entry effect known as the learning by exporting (LBE) effect (Clerides et al., 1998). However, the theoretical literature on the LBE effect is limited (Clerides et al., 1998; Pack and Saggi, 1999; Kostevc, 2005; Trofimenko, 2008) and the empirical literature has not been able to consistently sustain the LBE hypothesis (Wagner, 2007; ISGEP, 2008; Martins and Yang, 2009; Wagner, 2012). Consequently, there is not a consensus that the export activity boosts firms' productivity yet, as it has been found only for some countries, for some industries, for some periods and for some firms.

In a nutshell, the NNTT postulates that most productive firms self-select into exports given the existence of high export entry costs, and that exporting improves firms' productivity through a learning mechanism triggered by the export activity. Consequently, exporters must be more productive than non-exporters. This idea is formulated by the following mathematical identity.

$$\textbf{(1)} \quad exporter\ premium = self\ selection + learning\ by\ exporting$$

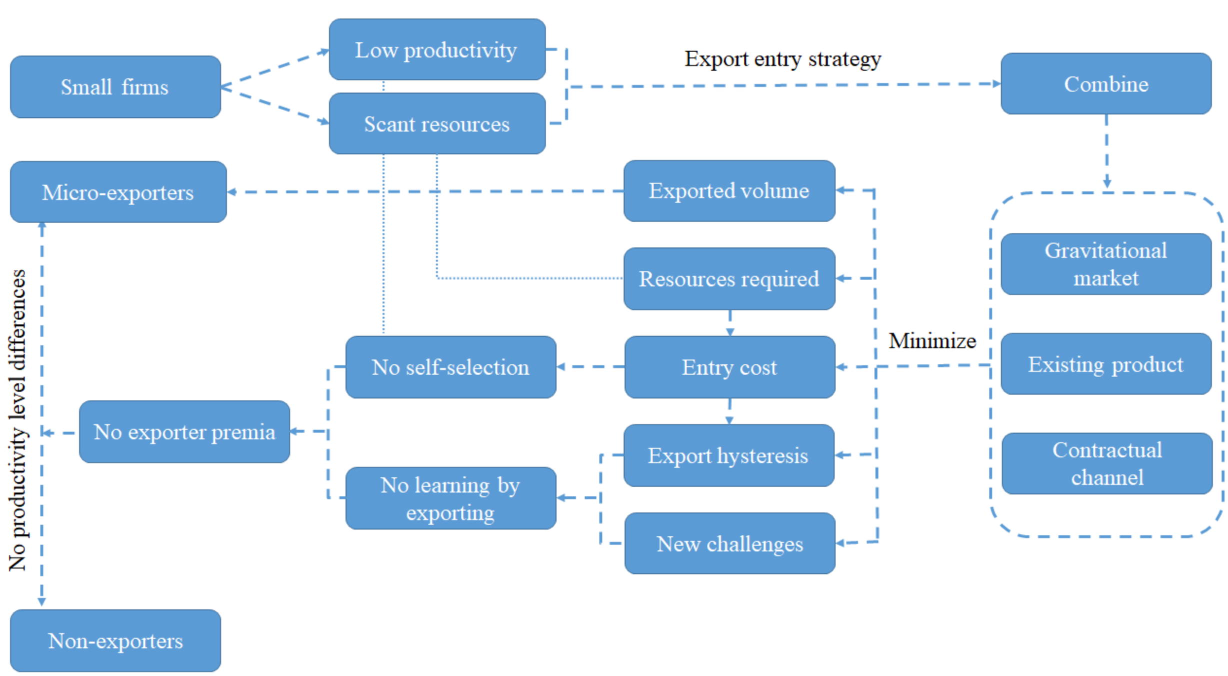
However, the existence of the exporter premium, the SS effect and the LBE effect is at odds with some well documented facts of international trade. International trade, in most countries, is extremely concentrated across the largest companies which coexist with a large quantity of small firms which export very little with no regularity (Mayer and Ottaviano, 2008; Freund and Pierola, 2012; Bernard et al., 2018). This suggests that for a significant number of firms, especially small and medium enterprises (SME) with low productivity and few resources, opportunistic, intermittent or even accidental exporting is commonplace (Bernini et at., 2016). In fact, there are many exporters which export small amounts, contradicting the existence of high export entry barriers as they will not find it profitable to absorb the high export entry cost. And, there are also many exporters which experience high turnover rates in and out of the export market, contradicting the existence of an export hysteresis among exporters created by the presence of high export re-entry costs or by positive LBE effects (Crick, 2004; Welch and Welch, 2009; Arkolakis, 2010; Eaton et al., 2011; Blum et al., 2013; Bernini et at., 2016).

Thus, if the above mathematical identity is true and only the most productive firms self-select into exports and the export activity increases their productivity, how is it possible that small firms with scarce resources and low productivity can export?

Seeking to answer this question the objective of this thesis is to study the connection between micro-exporters and productivity, more specifically the exporter premium hypothesis, the SS effect and the LBE effect, within the NNTT framework.

For this purpose, this thesis proposes a theoretical framework, as shown in figure 2, where small firms with few resources and low productivity consciously select export entry strategies which minimize the export entry cost (Arkolakis, 2010) to avoid the SS effect, but minimizing the amount exported and becoming micro-exporters. Nevertheless, once exporting they are not competitive enough to hold their position and they are expelled out of the market (Ruhl and Willis, 2017) with no opportunity to face new challenges from which to obtain significant gains from the LBE effect.

Figure 2. Conceptual export entry framework for small firms which become micro-exporters



Source: Own elaboration.

Specific Objective 1: to study the exporter premium on micro-exporters

As shown in figure 2, unproductive small firms with few internal resources (usually all goes hand in hand) employ export entry strategies which minimize the export entry cost and the resources needed, becoming micro-exporters which are no longer affected neither by the SS effect nor by the LBE effect. Therefore, if micro-exporters do no longer self-select according to their productivity levels before starting to export and if they do not become more productive thanks to the LBE mechanism triggered by the export activity, it can be concluded that micro-exporters are no more productive compared to non-exporting firms and that they do not enjoy the exporter premium as detailed in figure 2.

Accordingly, in Chapter I the following hypothesis is proposed and tested with descriptive analyses, regression tests and non-parametric tests with data for Spanish manufacturing firms for the period 1990-2015:

H1: Micro-exporters are no more productive than non-exporters

Specific Objective 2: to study the self-selection effect on new micro-exporters

As described in figure 2, in order to minimize the export entry cost and evade the SS effect unproductive small firms with few internal resources select export entry strategies which minimize the export entry cost such as exporting a product without adaptations, to a gravitational market and employing the distribution network of an intermediary. Nevertheless, these export entry strategies severely restrict the exported volume to tiny amounts per year by limiting exports to just one product within a distributor's network in a close market, so that these firms become micro-exporters.

Therefore, if firms with low productivity and scarce resources become micro-exporters which are not subject to the SS effect there should be no productivity difference between new micro-exporters and non-exporters before entry into exports takes place. Accordingly, in Chapter II the following hypothesis is proposed and empirically tested with descriptive analyses, regression tests and non-parametric tests with data for Spanish manufacturing firms for the period 1990-2015:

H2: New micro-exporters do not have higher productivity levels than non-exporters before starting to export

Specific Objective 3: to study the learning by exporting effect on micro-exporters

According to figure 2, if small firms which become micro-exporters, to cope with their low productivity and lack of resources, tend to enter gravitational markets through contractual channels by selling existing products, they minimize potential gains from the LBE effect as they outsource their involvement with the foreign market and create little room for new challenges. Additionally, the low export entry cost attained facilitates the quick entry and exit from the international market with no export hysteresis among micro-exporters which do not have enough time to assimilate and not enough commitment to implement the learning obtained from the foreign market. Then, it can be concluded that micro-exporters do not enjoy significant gains from the LBE effect, if any.

Therefore, if micro-exporters are unable to enjoy significant LBE productivity gains through the export activity there should be no productivity growth difference between new micro-exporters and non-exporters after the entry into exports. Accordingly, in Chapter III the following hypothesis is proposed and empirically tested with descriptive analyses, regression tests and non-parametric tests with firm-level data for Spanish manufacturing firms for the period 1990-2015:

H3: New micro-exporters do not experience higher productivity growths than non-exporters after starting to export

If the conceptual export entry framework for small firm with low productivity and few resources presented in figure 2 is supported by the export entry patterns of micro-exporters and it is validated through the three hypothesis proposed, it will have important implications on the current NNTT literature, as well as for business strategy and economic policy. Firstly, the conceptual framework proposes that there is a continuum of firms where micro-exporters do not enjoy the exporter premium, but the larger the exporter becomes the higher the exporter premium experiences. Secondly, it proposes that (almost) all firms can access the international market if they select the appropriate export entry strategy no matter their productivity level, but (most) with few possibilities of survival. Consequently, the existence of an export entry cost is no longer a valid answer to the question why some firms export while others do not. And thirdly, it proposes that exporting is not a lever of productivity on itself because many small firms lack the necessary resources and capabilities to absorb and implement new knowledge from the foreign market.

Furthermore, this thesis contributes to the international trade theory in two additional and meaningful ways. Firstly, this thesis identifies that firm-level databases which are frequently employed by the NNTT literature are biased towards a minority of large firms (Bernard and Jensen, 1995; Mayer and Ottaviano, 2008), given that these firms are easier to identify and contact, they have a higher response rate, they are more stable over time and they are more representative of the whole economy. This non-random selection criteria, based on the auto-selection bias of large firms which are more likely to answer a survey, and by a methodological bias, as large firms drop less frequently from unbalanced panel data, induces biases in the estimations (Heckman, 1979). Taking into consideration that national statistical firm-level datasets tend to oversample large companies, the results drawn from these databases do not fit very well reality because large firms tend to be more productive and become large exporters (Caves, 1989; Berry, 1992; Wagner, 2001). As a result, large firms experience different export processes than small firms which become micro-exporters such as self-selecting into exports, learning through the export activity and, consequently, they enjoy the exporter premium while micro-exporters do not.

Since, to date, the NNTT has not dealt with this sampling bias, the methodology proposed to address this large firm overrepresentation problem focuses the performed analysis on the specific data concerning Spanish micro-exporters, Spanish firms which export no more than Eur 25,000/year or Eur 50,000/year, so that the results obtained can conform better to their specific reality, expecting that this approach might circumvent the gap between the few firm-level econometric studies on micro, small and medium enterprises (MSME) and the lack of sufficient data about them (Wignaraja, 2013).

The selection of the Spanish case is very relevant for the study of micro-exporters and productivity within the NNTT framework as, according to the World Trade Organization (WTO), Spain is an open economy which ranks the top 17 merchandise exporting country and the 11 commercial services exporter which combined surpass 1/3 of Spain's GDP (WTO, 2018). In addition, the Spanish productive sector, as in many other countries, is composed by a majority of small companies with very few employees, where more than half only have one self-employed worker and more than 95 percent have less than 10 employees (DIRCE, 2016). Furthermore, the Spanish exporting landscape is composed mainly by an ample community of micro-exporters which keeps growing in importance over the last decades, where around half of all Spanish exporting firms export no more than Eur 25,000/year and about 2/3 export no more than Eur 50,000/year (ICEX, 2019). And, additionally, there is an ample background of NNTT literature on Spain thanks to the existence of suitable firm-level statistical databases such as the one employed in this thesis, also used by Delgado et al., 2002; Fariñas and Martín, 2007; Cassiman et al., 2010; García et al., 2012; Máñez et al., 2015; and Fariñas et al., 2016, among others.

As for the second contribution of this thesis to international trade theory, it allows us to explain the high turnover rates observed among exporting firms in and out of the export market which is caused by the lack of export hysteresis among micro-exporters. Given the low export entry cost attained by micro-exporters, they do not keep on exporting under adverse conditions to avoid repaying a high export (re)entry cost. The absence of high export entry costs deters export hysteresis and facilitates high turnover rates in and out of the international market for micro-exporters with quick entries and exits from the export activity. A smaller export entry cost allows small firms with scarce resources and low productivity to enter the export market. However, as they are closer to the entry productivity threshold, they are more likely to exit sooner. Therefore, as many of these small firms which become new exporters exit the export market during the initial years with no time to build-up an ample foreign demand, they remain small exporters (Ruhl and Willis, 2017).

In a nutshell, this thesis complements and expands the existing NNTT by incorporating the export dynamics of a neglected group of exporters, the micro-exporters, which represent a great proportion of all exporting firms in many countries.

This thesis follows a structure divided in three independent chapters which, nonetheless, are highly interrelated as Chapter I deals with the exporter premium, Chapter II focuses on the self-selection effect, and Chapter III concentrates on the learning by exporting effect. Each chapter maintains a structure similar to an academic paper containing: i) in section 1 an introduction to the topic of discussion, ii) in section 2 a review of the relevant NNTT literature including the background, the theoretical literature and the empirical literature, iii) in section 3 a detailed description of the conceptual framework for micro-exporters, iv) in section 4 an explanation of the research model and the variables used for investigation, v) in section 5 the methodology and data employed for testing, vi) in section 6 the results including a descriptive analysis of data, the empirical results and three robustness checks, and vii) in section 7 the main conclusions, the limitations of the study, the implications for business strategy and economic policy and avenues for further research. Apart from this, the annexes incorporate a table with a summary of relevant NNTT papers on the topic and a non-parametric test, to finalize every chapter with the biographical references.

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CHAPTER I.

THE EXPORTER PREMIUM

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1. Introduction

International trade is growing in importance as a field of study due to the rapid integration of national markets as one single worldwide market. Today consumers can easily acquire goods and services from all over the world, while domestic firms compete with foreign products and expand their operations by selling or investing in other countries. Although globalization is a much broader phenomenon which encompasses cultural, economic, environmental and social trends that interconnect people around the world, the economic aspect of globalization is the most pervasive, shaping all other three (cultural, environmental and social) with important implications for individuals, firms and governments alike.

Nevertheless, most of the international trade is done by a relatively few number of large firms which account for most of the volume exported, coined as export superstars (Freund and Pierola, 2012), with an extreme concentration of trade across the largest firms, creating export distributions that are highly skewed. In United States (US) the largest 1 percent of exporters control almost 80 percent of the country's total exports (Bernard et al., 2018), while in European countries such as Germany, France and the United Kingdom (UK) the top 1 percent account for about half of all exports (Mayer and Ottaviano, 2008) and over 50 percent in China (Manova and Zhang, 2012). For 32 developing and underdeveloped economies the top five exporters make up 30 percent of the country's total (non-oil) exports (Freund and Pierola, 2015)[1] and in Japan the top ten exporters account for 40 percent of total exports (Canals et al., 2007). A reality shared by the Spanish economy where there is a large number of firms that export very little with no regularity, which coexist with a tiny group of large exporters which in turn, concentrate the bulk of international trade, also known as granularity of exports, with the top five exporters accounting for 10 percent

[1] The 32 countries include nations from Africa (13), Latin America (9), Asia (7) and Eastern Europe (3): Albania, Bangladesh, Botswana, Bulgaria, Burkina Faso, Cambodia, Cameroon, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Egypt, Guatemala, Iran, Jordan, Kenya, Lebanon, Macedonia, Malawi, Mauritius, Mexico, Morocco, Nicaragua, Niger, Pakistan, Peru, Senegal, South Africa, Tanzania, Uganda and Yemen.

of the country's total exports and the largest 1 percent representing more than 70 percent of the exported volume (Lucio et al., 2017).

The current international trade literature supports the idea that exporters have better performance characteristics than non-exporters as they employ more workers, pay higher wages, they are more capital intensive and, especially, they have higher productivity levels (Bernard and Jensen, 1995; Wagner, 2007a; Wagner, 2012). A performance difference between exporters and non-exporters which is better known as the exporter premium. Nevertheless, the firm-level databases employed by the relevant literature are frequently biased towards a minority of large exporters, distorting a reality which is made up by a large majority of tiny exporters. By focusing the analysis of the data on those firms that best represent the large mass of tiny exporters, also called micro-exporters, Chapter I examines if, on average, micro-exporters have no better performance characteristics than non-exporting firms and if the exporter premium only applies to large exporters.

Chapter I adds to the current international trade literature by explaining a gap in the New New Trade Theory (NNTT) literature created on the basis of biased firm-level databases towards large exporters. It also presents a conceptual framework to understand the export entry behavior for the large mass of micro-exporters, where micro-exporters employ export entry strategies which minimize the export entry cost and the resources needed to enter the international market, to make up for their low productivity levels and few resources. Finally, Chapter I provides empirical support for the hypothesis that micro-exporters are no more productive than non-exporters, at the same time that it validates previous findings of the NNTT literature on the existence of the exporter premium for all exporters when biased databases are used. This different export reality of micro-exporters versus large exporters has important implications for business strategy on exports and growth, and for economic policy, especially on the impact of export promotion programs (EPP), which are analyzed and discussed.

The structure of Chapter I is organized as follows: section 2 reviews the theoretical and empirical literature relevant to the exporter premium. Section 3 explains the gap which exits within the current NNTT literature as a consequence of a bias which affects national firm-level databases towards large firms and large exporters, as well as presentung a conceptual framework for small exporters, called micro-exporters, to enter the export market. Section 4 includes the research model and the variables of investigation. Section 5 presents the methodology and data used for testing. Section 6 interprets the results obtained by the descriptive and econometric analyses of the data, including several robustness checks. Finally, section 7 explains the main results, the limitations of the investigation, the most important implications at a business strategy level and at an economic policy level, and ends with potential avenues for further research. Chapter I finalizes with a section of annexes which contain an extended review of the relevant empirical NNTT literature on the exporter premium, as well as additional statistical data, plus a non-parametric test of the hypothesis under investigation, finishing with the biographical list of the papers mentioned in the chapter.

2. The exporter premium

2.1. Background

The exporter premium is defined as, ceteris paribus, the performance difference between exporters and non-exporters, by which exporting firms have superior performance attributes compared to non-exporting firms, specifically, a higher productivity level (Wagner, 2007a).

The theoretical basis for the link between export activity and productivity is rooted in the macroeconomic models of the past century, most of them relating to the positive link found among country openness, exports and economic growth. Here two schools of thought diverge, the growth-led exports literature and the export-led growth literature.

On the one hand, advocates of the growth-led exports literature set the causal direction from economic growth to export activity (Caves, 1971). Economic growth enhances the technology of production and labor skills of a country and creates or amplifies the competitive advantage which determines exports at a national level (Krugman, 1984).

On the other hand, the export-led growth literature claims that the direction of causality goes from export activity to economic growth. Firstly, exports are a fundamental component of the national aggregate demand and determines the multiplier effect on investment and output (Kaldor, 1970). Secondly, exports generate inflows of foreign currency which are required to finance advanced technology and specialized services imports (Kaldor, 1970). And third, trade exposes countries to their trading partner´s knowledge by means of new technology, goods and services that incorporate this knowledge. Therefore, by promoting international trade the flow of new knowledge from international contacts increases with potential spillover effects at a national level, pushing the productivity frontier outwards so that countries attain a higher economic growth (Grossman and Helpman, 1991).

It may be very plausible that both approaches are correct as, to date, no empirical evidence is conclusive. Giles and Williams (2000a) review more than 150 papers and cannot establish a clear conclusion about the causality direction. Most of the papers with cross-country data analyzed by Giles and Williams (2000a) find a positive association between exporting activity and economic growth. However, these results do not exclude growth-led exports. With the analysis of time-series papers which test the export-led growth hypothesis Giles and Williams (2000b) find mixed results, and many times these results are sensitive to features of the model such as the variables included and the lag effects. As a result, no conclusive evidence has been reached on the causality direction between exports and growth.

Starting in the mid-90s papers jumped from a macroeconomic level to a microeconomic level, reaching the firm level, to link exports and economic growth based on the individual behavior of companies. Exploiting the recent availability of firm-level national statistical datasets, this new strand of international trade literature known as NNTT has become mainstream nowadays.

2.2. Theoretical framework. The self-selection effect and the learning by exporting effect

To explain why exporters are more productive than non-exporters, known as the exporter premium, the NNTT literature puts forward two alternative hypotheses, not mutually exclusive, about why firms that export might be more productive than non-exporters.

The first hypothesis points to the self-selection (SS) of the most productive firms into the export market, known as the SS effect. To access the export market there are important export entry costs such as the cost of setting up a new distribution and after-sale service network, the cost of establishing a brand name abroad through advertising, and the cost of bringing the domestic product into conformity with foreign health and safety regulations (Baldwin, 1988). As any entry barrier, the export entry cost, which takes the form of a sunk cost, reduces the expected profit from exporting, making the investment required to become an exporter less appealing and creates persistence in the export status. The sunk-cost model predicts that only the most productive firms, which can afford to pay the export entry cost, become exporters and once exporting they tend to remain exporters to avoid paying the (re)entry cost again. This behavior is better known as export hysteresis (Baldwin, 1988; Baldwin and Krugman, 1989; Dixit, 1989).

Building on the export hysteresis and the sunk-cost model the SS hypothesis has its theoretical foundations in a seminal paper by Melitz (2003) which has become the NNTT mainstream model. Melitz (2003) proposes that there are additional costs of selling goods in foreign countries such as transport costs, tariffs, market research and advertising, among many others. All these costs create an entry barrier that less productive firms cannot bear because within their price structures there are no margins to add the extra costs of exporting and secure a profit by selling their products in the international market. However, more productive firms, with lower cost structures or higher sales margins, have enough room to absorb the extra cost of exporting and obtain a profit in the foreign market. In this manner, the export activity keeps out firms with low productivity as they are unable to overcome the entry barrier created by the extra cost required to access the export market. Low productivity firms tend to remain non-exporters, competing only in the domestic market, while highly productive firms tend to become exporters (Melitz, 2003).

The second hypothesis points towards a learning by exporting (LBE) mechanism by which exporting itself is good for firms as there is a positive post-entry effect on productivity, known as the LBE effect. Firms which sell in the international market are exposed to fiercer competition than in the domestic market. Due to this situation they keep on improving their performance to be able to compete in the foreign market in the long term (Castellani, 2002). Another explanation for the LBE effect is that when firms compete in the export market they are exposed to the interaction with international buyers and competitors, gaining from this interaction new knowledge and direct access to new technologies which increase their productivity (Evenson and Westphal, 1995). Consequently, entering the export market is beneficial for firms as it increases their productivity, for instance by reducing the marginal production costs through a learning mechanism triggered by the export experience (Clerides et al., 1998).

Therefore, if the most productive firms self-select into the export market given the existence of high export entry costs and if exporting improves the firm's productivity through a learning mechanism triggered by the export activity, it is straightforward to think that exporters must be more productive than non-exporters. This difference in the productivity level between exporters and non-exporters is known as the exporter premium, formulated by the following mathematical identity.

$$\textbf{(2)} \quad exporter\ premium = self\ selection + learning\ by\ exporting$$

2.3. Review of the empirical literature. Evidence for the exporter premium

The pioneer publication by Bernard and Jensen (1995) marks the beginning of the NNTT literature. The authors seeking to confirm the common knowledge that exporters are more competitive and more productive for the economy, therefore winners, employ newly available detailed plant-level data on US manufacturing establishments to investigate the relationship between exporting and plant performance. Using a 1987 cross-sectional sample of US manufacturing plant their results are revealing. Only a small portion of manufacturing establishments export and, on average, exporters are larger in terms of sales and employment, more capital intensive, pay higher wages and they are more productive, measured as labor productivity either by sales per worker or value added per worker. Bernard and Jensen (1995) call this superior performance of exporters to non-exporters the exporter premium, linking exports to successful performance, and founding the million times repeated mantra that exporters are more productive than non-exporters. Without knowing it Bernard and Jensen (1995) started a new strand of international trade literature, as researchers began to use the rich firm-level datasets collected by national statistical offices to study the export activity of firms, its causes and consequences.

Later, Bernard and Wagner (1997) examine if exporting plants in the State of Lower Saxony (Germany), for the period 1978 to 1992, have better performance attributes than non-exporters, even within the same industry. They report that exporters are larger in terms of sales and employment. They pay better wages and they are more productive than non-exporters. The labor productivity difference between exporters and non-exporters, if modest, is positive and this productivity gap tends to increase with the establishment size. In conclusion, Bernard and Wagner

(1997) find positive, but not strong, evidence in favor of the exporter premium, as exporting plants tend to have higher productivity levels than domestic plants.

Clerides et al., (1998), with data from the 80s and the early 90s for Moroccan, Mexican and Colombian manufacturing plants, employ the average cost and labor productivity, measured as sales per worker, to check the existence of the exporter premium. They divide all firms into five groups: non-exporters, entrants, exporters, quitters and switchers, to find that entering plants and exporting plants have the lowest average costs and the highest labor productivity, while non-exporters and quitters have the highest average cost and the lowest labor productivity. The results obtained by Clerides et al., (1998) point towards a productivity gap between exporters and non-exporters which supports the existence of the exporter premium hypothesis.

Again, Bernard and Jensen (1999) employ cross-sectional samples for the years 1984, 1987 and 1992 with US manufacturing establishments to check the validity of the exporter premium hypothesis. They report that, on average, plants which export are larger in terms of sales and workforce, they are more labor productive and they pay higher wages, compared to plants that do not export for all the three years examined, even after controlling for industry, state and size. Bernard and Jensen (1999) find positive evidence in favor of the exporter premium where exporting firms have higher productivity levels than non-exporters.

Aw et al., (2000) with data from the 80s and the early 90s for South Korea and Taiwan factories for five major export industries: textiles, plastics, electrical machinery, apparel, and transportation equipment, compare the annual cross-sectional average productivity differences for the group of plants that export versus the group of plants that do not export. They obtain evidence in favor of the exporter premium hypothesis as they conclude that the average productivity difference between exporters and non-exporters is positive and statistically significant for factories in all five industries, in both countries, for all the years analyzed.

Then, Bernard and Jensen (2004a) with a sample of US manufacturing plants, for the period 1983 to 1992, follow a similar empirical strategy to Bernard and Jensen (1999) and compare the average productivity differences for groups of plants which undergo the transition pattern from non-exporters to exporters during five-year intervals. Bernard and Jensen (2004a) conclude that continuing exporting plants have higher productivity levels compared to continuing non-exporting plants, even after controlling for industry and year effects, validating the exporter premium hypothesis so strongly established in previous studies.

After these pioneering works, more and more papers which employ firm-level datasets from different countries, for different periods and with various statistical methodologies consolidate the opinion that there is evidence to support the exporter premium as reported in table a1 (in annexes).

For Spain, Delgado et al., (2002) with a sample of Spanish manufacturing firms for the period 1991 to 1996, use a non-parametric method (Kolmogorov-Smirnov test) to check if exporters are more productive than non-exporters. They propose that in the presence of the exporter premium the productivity distribution of exporters should stochastically dominate the productivity distribution of non-exporters. Defining exporters as firms that export in year *t*, and non-exporters as firms that do not export in year *t*, Delgado et al., (2002) obtain evidence which supports the hypothesis that, for the whole population of firms, the productivity of exporters stochastically dominates the productivity of non-exporters for every year examined, indicating the existence of the exporter premium.

Fariñas and Martín (2007) with the same sample of Spanish manufacturing firms as Delgado et al., (2002), but this time for the period 1990 to 1999, ratify that exporters are larger in terms of sales and employment, more capital intensive, they invest more in research and development (R&D) and they are more productive, measured as value added per hour worked, than non-exporting firms. To test the validity of the exporter premium they estimate the labor productivity difference between exporters, which includes continuing exporters and entering exporters, and non-exporters, controlling for several firm characteristics such as age and size. Fariñas and Martín (2007) obtain a positive and significant labor productivity difference in favor of exporting firms, supporting the exporter premium hypothesis.

Cassiman et al., (2010) use a non-parametric test similar to Delgado et al., (2002) and data from the same database for Spanish manufacturing firms for the period 1991 to 1998, to validate the existence of the exporter premium. They favor this methodology because the non-parametric test does not compare productivity averages only, but rather it takes into account the overall productivity distribution without making any specific assumption about the relationship between productivity and exports. Cassiman et al., (2010) find that the productivity distribution of exporters stochastically dominates the productivity distribution of non-exporters, and that this productivity gap is shorter when exporters and non-exporters are innovative firms and that it becomes broader otherwise. Owing to these results the authors suggest the existence of the exporter premium.

Next, Minondo (2014) with data for Spanish service sector firms for the period 2001 to 2007, finds that exporters in the service sector are more productive than non-exporters, supporting the existence of a labor productivity premium for exporting firms. Minondo (2014) also reports that the exporter premium is larger for firms that supply non-Internet-related services, such as real estate and recreational activities, than for firms that supply Internet-related services, which includes services that can be transferred electronically. This result implies that the barriers to export are larger for firms in non-Internet-related services than for firms in Internet-related services that export their services online (Minondo, 2014).

Due to the fact that all these studies employ different testing methods, with different productivity measures, applied to different countries, the main effort to homogenize the exporter premium testing protocol comes from the International Study Group on Exports and Productivity (ISGEP). ISGEP is a team composed of economists from several countries who use comparable firm-level panel data from 14 nations (including Spain) with a common statistical methodology to investigate the relationship between productivity and exports (ISGEP, 2008)[2]. To test the exporter premium hypothesis they compared the labor productivity level between the group of non-exporters, all firms that do not export in year *t*, and the group of exporters, all firms that export in year *t*, controlling for firms characteristics such as size, wage and industry. Their main finding is that exporters, including Spanish exporters, are more labor productive, measured as sales per worker, than non-exporters, validating the exporter premium hypothesis. However, the exporter premium varies a lot across countries due to factors such as national trade policies, per capita gross domestic product (GDP), and the country's regulatory environment (ISGEP, 2008).

To summarize all the NNTT evidence on the exporter premium, Wagner (2007a) reviews most of the papers that employ firm-level dataset analyses, published since the beginning of the NNTT literature in 1995. He develops a meta-analysis with 54 empirical studies and data from 34

[2] The 14 countries analyzed by ISGEP includes: Austria, Belgium, Chile, China, Colombia, Denmark, France, Germany, Italy, Ireland, Slovenia, Spain, Sweden and UK.

countries to find out an overwhelming support in favor of the existence of the exporter premium (Wagner, 2007a). Again, Wagner (2012) presents a new meta-analysis which covers 25 empirical papers with data from 11 countries that were published after 2006, to reassert his previous conclusion that within the NNTT literature there is strong evidence in favor of the exporter premium hypothesis.

To sum up the existing literature on the exporter premium, the NNTT proposes two hypotheses to explain why exporters are more productive than non-exporters, the so-called exporter premium. The first hypothesis, known as the SS effect, states that there are entry costs to access the international market and that only the most productive firms can bear these entry costs, leaving firms with low productivity such as non-exporters and creating persistence in the export status of the firm due to an export hysteresis effect (Melitz, 2003). The second hypothesis, known as the LBE effect, states that exporting increases firms' productivity because exporters learn from international buyers and competitors new techniques, while they gain access to new knowledge, technologies and designs that can be implemented internally to boost their productivity (Clerides et al., 1998). These two effects, individually or combined, are responsible for the higher productivity of exporters compared to non-exporters, also known as the exporter premium.

The NNTT theoretical models which conceptualize the exporter premium are supported by the empirical literature which finds overwhelming evidence in favor of the hypothesis that exporters have superior performance characteristics compared to non-exporters. Among other characteristics, on average, exporters are larger in terms of employment and sales, they invest more in R&D, they pay higher wages and, more importantly, they are more productive than non-exporters, confirming the existence of the exporter premium.

3. Conceptual framework for micro-exporters

3.1. Cracking the gap. A Spanish reality full of micro-exporters

The database *Perfil de la Empresa Exportadora Española*, the Profile of the Spanish Exporting Company, elaborated by the *Instituto Español de Comercio Exterior* (ICEX), the Spanish Institute for Foreign Trade, contains all the officially registered exporters per year in Spain during the period 2000 to 2015, with data obtained from the Spanish Customs and Excise Duties Department. According to this database, as shown in table 1, around half of all Spanish exporting firms do not export more than Eur 25,000/year and about 2/3 do not export more than Eur 50,000/year. Needless to say, there is a clear majority of micro-exporters among Spanish exporting firms, as depicted in table 1. It is important to highlight that the Eur 25,000/year and Eur 50,000/year thresholds have been selected given the abundance of exporting firms within these export bands since, to date, there has not been any previous categorization of micro-exporters in the relevant literature and a new parametrization standard is required.

Table 1. Number of exporters and micro-exporters in Spain and the share of micro-exporters among all exporters, period 2000-2015

Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
All exporters	66,278	69,307	90,082	93,279	96,401	99,232	100,177	97,418
Micro-exporters <= €25,000/year	28,901 (44%)	30,404 (44%)	49,782 (55%)	52,726 (57%)	56,258 (58%)	58,630 (59%)	58,707 (59%)	55,920 (57%)
Micro-exporters <= €50,000/year	33,861 (51%)	35,528 (51%)	55,375 (61%)	58,502 (63%)	61,781 (64%)	64,319 (65%)	64,660 (65%)	61,922 (64%)
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
All exporters	101,395	107,579	109,363	123,128	137,528	151,160	147,845	147,334
Micro-exporters <= €25,000/year	59,577 (59%)	67,245 (63%)	67,498 (62%)	80,282 (65%)	92,349 (67%)	104,706 (69%)	101,114 (68%)	101,394 (69%)
Micro-exporters <= €50,000/year	65,945 (65%)	73,727 (69%)	74,220 (68%)	87,031 (71%)	99,826 (73%)	112,263 (74%)	108,386 (73%)	108,615 (74%)

Source: Own elaboration with data from ICEX database. All exporters subsumes both groups of micro-exporters. The group of micro-exporters who do not export more than Eur 50,000/year subsumes the group of micro-exporters that do not export more than Eur 25,000/year. In brackets ( ) the percentage of micro-exporters in each group per the total number of exporters.

The existence of so many micro-exporters is in sharp contrast with the existence of a SS effect and the existence of a LBE effect which the mainstream NNTT literature advocates, as well as with the existence of the exporter premium.

The SS effect postulates that in order to enter an export market a firm must incur additional exporting costs such as market research, label translation, setting up new networks for product distribution and after-sale services, developing new advertising and promotion in the foreign market, and covering fees to certify to international standards, among many other costs (Wagner, 2007a). In the presence of these export entry costs micro-exporters will never find rational to enter the export market by exporting such tiny amounts per year as it makes it very difficult to retrieve the extra cost associated with the export activity. For instance, if a firm requires to audit, implement and certify its processes or products to an international standard such as ISO 9000 to sell abroad, as often governments and private firms require from suppliers, and this certification costs Eur 100,000 (Guler et al., 2002; Hallak and Sivadasan, 2013), it takes about 6 years for a micro-exporter to level out the cost with profits from exporting, deterring any potential micro-exporter from entering the export market.

Another important attribute of micro-exporters is the high turnover rate that they experience entering and exiting the export market. As shown in table 2 about 2/3 of all Spanish micro-exporters which do not export more than Eur 25,000/year enter and exit the international market in less than twelve months. This low export persistence level contradicts the existence of the export hysteresis by which exporters keep on exporting to avoid paying again the export re-entry cost.

Table 2. Number and share of Spanish micro-exporters that do not export more than Eur 25,000/year which enter and exit the export market per year, period 2000-2015

Micro-exporters <= €25,000/year								
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
All micro-exporters <= €25,000/year	28,901	30,404	49,782	52,726	56,258	58,630	58,707	55,920
Entering micro-exporters <= €25,000/year	-	21,795 (72%)	39,496 (79%)	37,185 (71%)	39,877 (71%)	41,463 (71%)	40,891 (70%)	37,643 (67%)
Exiting micro-exporters <= €25,000/year	20,292 (70%)	20,118 (66%)	34,241 (69%)	36,345 (69%)	39,091 (69%)	40,814 (70%)	40,430 (69%)	37,388 (67%)
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
All micro-exporters <= €25,000/year	59,577	67,245	67,498	80,282	92,349	104,706	101,114	101,394
Entering micro-exporters <= €25,000/year	41,045 (69%)	48,555 (72%)	48,056 (71%)	60,600 (75%)	66,228 (72%)	75,800 (72%)	70,399 (70%)	70,350 (69%)
Exiting micro-exporters <= €25,000/year	40,887 (69%)	47,803 (71%)	47,816 (71%)	54,161 (67%)	63,443 (69%)	73,991 (71%)	70,070 (69%)	-

Source: Own elaboration with data from ICEX database. The data only considers micro-exporters who do not export more than Eur 25,000/year. In brackets ( ) the percentage of entering and exiting micro-exporters per the total number of micro-exporters per year. Entering firms includes all firms that do not belong to the group of micro-exporters in year *t-1* and become micro-exporters in year *t*. Exiting firms includes all firms which belong to the group of micro-exporters in year *t-1* and exit the group in year *t*. Note that it is not the same as to enter or exit the export market. As a result, the final values of entering and exiting micro-exporters from the export market are lower than the values reported in the table.

A high turnover rate in and out of the export market which makes very difficult for micro-exporters to learn by exporting as learning takes time to acquire new knowledge and implement it into new productivity enhancing improvements, where only the firms that are consistently exposed to the export market learn from it (Fernandes and Isgut, 2015). Often, micro-exporters seem to have an export activity which is closer to opportunistic commercial deals (passive exporting initiated by overseas buyers) with quick entries and exits from the international market, compared with an export activity similar to long-term deals with a lengthy presence in the export market from where they gain new knowledge and obtain new technology through the continuous interaction with foreign customers and competitors. Consequently, the short span of the exporting activity of micro-exporters deters potential productivity gains from the LBE effect.

Table 3 shows a similar behavior for Spanish micro-exporters that do not export more than Eur 50,000/year, where about 2/3 of all these Spanish micro-exporters enter and exit the international market in less than twelve months.

Table 3. Number and share of Spanish micro-exporters that do not export more than Eur 50,000/year which enter and exit the export market per year, period 2000-2015

Micro-exporters <= €50,000/year								
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
All micro-exporters <= €50,000/year	33,861	35,528	55,375	58,502	61,781	64,319	64,660	61,922
Entering micro-exporters <= €50,000/year	-	23,628 (67%)	41,455 (75%)	38,974 (67%)	41,344 (67%)	43,105 (67%)	42,638 (66%)	39,306 (63%)
Exiting micro-exporters <= €50,000/year	21,961 (65%)	21,608 (61%)	35,847 (65%)	38,065 (65%)	40,567 (66%)	42,297 (66%)	42,044 (65%)	39,048 (63%)
Year	2008	2009	2010	2011	2012	2013	2014	2015
All micro-exporters <= €50,000/year	65,945	73,727	74,220	87,031	99,826	112,263	108,386	108,615
Entering micro-exporters <= €50,000/year	43,071 (65%)	50,553 (69%)	50,238 (68%)	62,953 (72%)	68,819 (69%)	78,015 (69%)	72,374 (67%)	72,193 (66%)
Exiting micro-exporters <= €50,000/year	42,771 (65%)	49,745 (67%)	50,142 (68%)	56,024 (64%)	65,578 (66%)	76,251 (68%)	71,964 (66%)	-

Source: Own elaboration with data from ICEX database. The data only considers micro-exporters who do not export more than Eur 50,000/year. In brackets ( ) the percentage of entering and exiting micro-exporters per the total number of micro-exporters per year. Entering firms includes all firms that do not belong to the group of micro-exporters in year *t-1* and become micro-exporters in year *t*. Exiting firms includes all firms which belong to the group of micro-exporters in year *t-1* and exit the group in year *t*. Note that it is not the same as to enter or exit the export market. As a result, the final values of entering and exiting micro-exporters from the export market are lower than the values reported in the table.

Therefore, in the absence of the SS effect and the LBE effect, it could be inferred that the exporter premium does not apply to micro-exporters. According to the Spanish data, there is no solid reason to believe that micro-exporters are more productive than non-exporters before entering the international market and that they become more productive through the export activity. Owing to this, the hypothesis that micro-exporters are more productive than non-exporters, known as the exporter premium, does not seem to be sustained by the data.

3.2. Sampling biases

The existence of so many micro-exporters in Spain is at odds with the SS effect, the LBE effect and the exporter premium, but the NNTT empirical literature seems oblivious of this fact.

As Bernard and Jensen (1995) already remark in their pioneering work that set forth the NNTT literature, firm-level datasets collected by national statistical offices are most probably biased towards large companies. In their papers Bernard and Jensen (1995, 1999, 2004a) employ the Annual Survey of Manufactures (ASM), which collects detailed plant-level data by sending questionnaires to about 56,000 US establishments of the 220,000 plants surveyed in the Census of Manufactures. Some of the 56,000 establishments, those with more than 250 employees, with large sales or owned by large enterprises, are included in the sample with certainty. The rest of the firms are sampled with probabilities ranging from 0.99 percent to 0.005 percent according to their size and economic importance. This leads Bernard and Jensen (1995) to state that small plants are undersampled in the ASM and that the results of their study are most probably biased towards large firms.

ISGEP (2008), working with samples which are restricted to firms with 20 or more employees, state that the performance features of a firm are strongly affected by its size, and that the use of restricted or non-exhaustive samples render different and biased results. Mayer and Ottaviano (2008) employ firm-level databases for France, Germany, Hungary, Italy and UK, which are restricted to relatively large firms. They find significant biases in their results compared to the results obtained with exhaustive samples. For instance, the German database only covers firms with more than 20 employees, for Hungary the dataset includes firms with annual exports larger than Eur 400,000, and for Italy the sample contains a small percentage of firms with less than 500 employees and no firms with less than 12 workers.

In Spain economist draw data from the *Encuesta sobre Estrategias Empresariales* (ESEE), the Survey on Business Strategies, being the database most frequently employed by the NNTT literature to analyze the Spanish case: Delgado et al., 2002; Campa, 2004; Salomon and Shaver, 2005; Fariñas and Martín, 2007; Blanes et al., 2008; ISGEP, 2008; Máñez et al., 2009; Avella and García, 2010; Cassiman et al., 2010; Máñez et al., 2010; Garcia et al., 2012; Correa and Doménech, 2012; Manjón et al., 2013; Máñez et al., 2015; and Fariñas et al., 2016. In the ESEE, firms are sampled according to their size. In 1990 all manufacturing firms with more than 200 employees (called large firms) were required to participate, reaching an average reply level of 70 percent. However, manufacturing companies with a workforce that ranged between 10 and 200 employees (called small firms) were selected using a sample which comprised of approximately 5 percent of the total population of small firms. Manufacturing firms with less than 10 employees were excluded from the sample. This initial representation level of the sample has been preserved to date.

To better understand how the ESEE overrepresents large firms, the structure of this sample is compared to the aggregate data which takes into account all manufacturing companies in Spain. According to the *Estadística Estructural de Empresas del Sector Industrial*, the Structural Business Statistics for the Industrial Sector Companies, elaborated by the *Instituto Nacional de Estadística* (INE), the National Institute of Statistics, more than 90 percent of all Spanish manufacturing firms have less than 20 employees, while only 3 percent have more than 50 employees. On the other hand, in the ESEE only 25 percent of the firms sampled have less than 20 employees, and half of the firms have more than 50 employees.

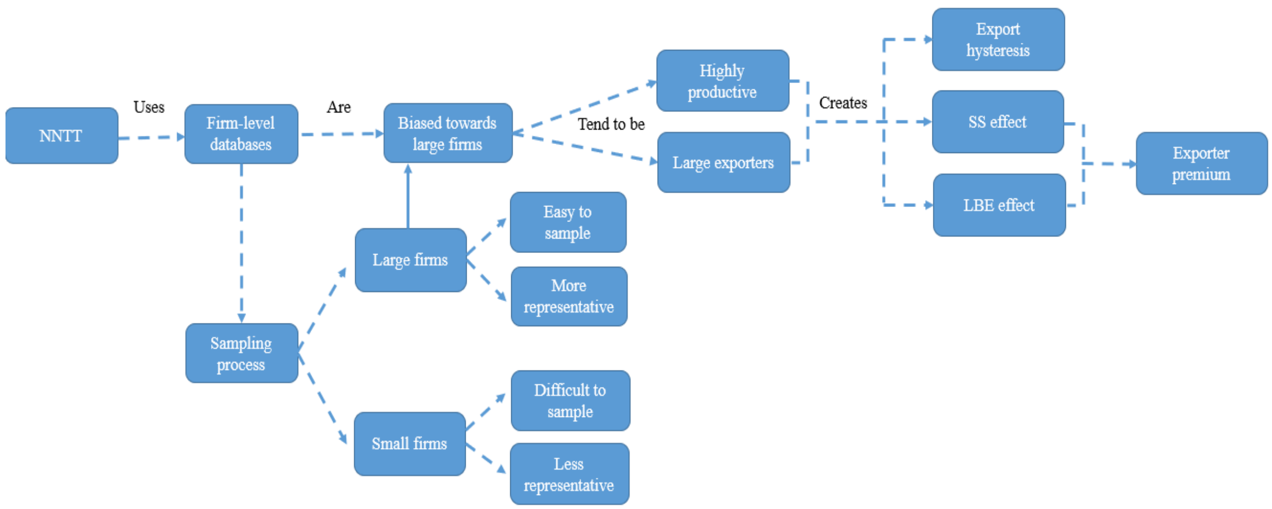
This overrepresentation of large firms in the ESEE and other national statistical databases might be explained by the fact that firm-level datasets tend to sample proportionally more large companies due to various factors: i) large firms are easy to identify and contact by researchers because their information is readily available for public access, ii) statistical agencies focus on large firms because they represent a larger aggregate share of the economy, iii) statistical agencies focus on large firms because they are more likely to survive for a longer period of time, and iv) large firms have more personnel and by this it is more likely that the questionnaire is answered and sent back to the statistical agency.

In his seminal paper Heckman (1979) already explains how statistical analyses based on non-randomly selected samples induce biases in estimations. Heckman (1979) proposes that samples tend to be biased for two reasons. First of all, by an self-selection of the individuals being investigated, such as if firms with more workers are more readily to answer the questionnaire. Secondly, by a bias in the sampling methodology employed by the researched. For instance, in panel databases, to perform time series analyses, the stability of the subject under investigation is desirable, so if large firms tend to survive for longer periods of time they will tend to be overrepresented along the panel sample. Hence, the empirical performed analysis with biased firm-level databases might be prone to provide biased and erroneous estimates of the population of firms as a whole, since the estimates are a function of a biased selected sample of companies and not a randomly drawn sample from the population of firms (Choudhury, 2002).

Nevertheless, despite the large-firm overrepresentation bias in firm-level national statistical databases, the NNTT literature has not addressed the overrepresentation problem in an effort to perform a closest-to-reality analysis. As explained in figure 3, the results drawn from biased firm-level databases do not fit reality very well because large firms tend to be more productive as firm size indicates a higher productivity level through economies of scale, a further advance down the learning curve, or a competitive advantage to attain the tenure required to expand the labor force (Bernard and Jensen, 2004b). At the same time, large firms tend to be (large) exporters as there is a well-known positive correlation between firm size and export participation (Caves, 1989; Berry, 1992), which has become a stylized fact backed by ample econometric analyses and theoretical investigations (Wagner, 2001).

As explained in figure 3, the NNTT literature employs firm-level statistical databases which are biased towards large firms given that they are easier to sample and more representative of the whole economy than small firms, creating a sampling process biased towards large companies. Due to the fact that these large firms tend to be more productive and they tend to become (large) exporters more often than small firms, the large-firm overrepresentation problem creates datasets which overrepresent highly productive companies and (large) exporters which experience different export processes than micro-exporters for instance self-selecting into exports, a higher level of export persistence (export hysteresis), learning through the export activity and as a result, they are more likely to enjoy the exporter premium than micro-exporters. All these dynamics have been captured by previous analyses in the NNTT literature which employ biased firm-level statistical datasets that overrepresent large companies.

Figure 3. The large-firm overrepresentation bias in databases and how it affects the measurement of the exporter premium



Source: Own elaboration.

To assess how the large-firm overrepresentation bias affects the representativeness of micro-exporters in the Spanish case, the ICEX database that contains all the officially registered exporters per year in Spain is compared to the ESEE dataset in table 4.

Table 4 shows that Spanish firms who do not export more than Eur 25,000/year and Eur 50,000/year comprise of between half and 2/3 of all Spanish exporters for the period 2000 to 2015, while in the ESEE database these (micro-exporting) firms account for less than 10 percent of all the exporters sampled. As predicted, the large-firm overrepresentation problem biases the ESEE database towards large exporters.

Table 4. Difference in the representativeness of exporters between ESEE and ICEX databases, period 2000-2015

		Year							
Data	**Exporters**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
ICEX	All exporters	66,278	69,307	90,082	93,279	96,401	99,232	100,177	97,418
	Exporters <= €25,000/year	28,901 (44%)	30,404 (44%)	49,782 (55%)	52,726 (57%)	56,258 (58%)	58,630 (59%)	58,707 (59%)	55,920 (57%)
	Exporters <= €50,000/year	33,861 (51%)	35,528 (51%)	55,375 (61%)	58,502 (63%)	61,781 (64%)	64,319 (65%)	64,660 (65%)	61,922 (64%)
ESEE	All exporters	1,191	1,101	1,098	885	883	1,168	1,246	1,235
	Exporters <= €25,000/year	67 (6%)	63 (6%)	64 (6%)	40 (5%)	43 (5%)	60 (5%)	81 (7%)	83 (7%)
	Exporters <= €50,000/year	112 (9%)	94 (9%)	95 (9%)	66 (7%)	68 (8%)	96 (8%)	121 (10%)	123 (10%)
		Year							
Data	**Exporters**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
ICEX	All exporters	101,395	107,579	109,363	123,128	137,528	151,160	147,845	147,334
	Exporters <= €25,000/year	59,577 (59%)	67,245 (63%)	67,498 (62%)	80,282 (65%)	92,349 (67%)	104,706 (69%)	101,114 (68%)	101,394 (69%)
	Exporters <= €50,000/year	65,945 (65%)	73,727 (69%)	74,220 (68%)	87,031 (71%)	99,826 (73%)	112,263 (74%)	108,386 (73%)	108,615 (74%)
ESEE	All exporters	1,241	1,279	1,316	1,225	1,265	1,168	1,106	1,037
	Exporters <= €25,000/year	90 (7%)	92 (7%)	85 (6%)	74 (6%)	92 (7%)	63 (5%)	60 (5%)	58 (6%)
	Exporters <= €50,000/year	129 (10%)	134 (10%)	132 (10%)	113 (9%)	116 (9%)	90 (8%)	94 (8%)	91 (9%)

Source: Own elaboration with data from the ICEX database and the ESEE database. In brackets ( ) the percentage of firms who do not export more than Eur 25,000/year and Eur 50,000/year as per the total number of exporters per year for each sample. For the ESEE database all information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded.

Moreover, as predicted, large firms tend to be more productive and become (large) exporters. Table 5 includes six different firm size groups that go from left, small firms with less than 20 employees, to right, large firms with more than 500 employees. In the ESEE, firms with more than 500 workers are, on average, almost three times more labor productive, three times more likely to be an exporter and, if exporting, they sell abroad 1,000 times more than firms with less than 20 workers. As expected, the assumption that large firms are more productive and become (large) exporters is supported by the ESEE data found in table 5.

Table 5. Firm size, productivity and exports of Spanish firms, period 1990-2015 (constant values in euros)

	Average number of employees per year					
	<20 employees	20-50 employees	51-100 employees	101-200 employees	201-500 employees	>500 employees
Group representativeness within the ESEE (%)	25.25	25.19	10.13	10.89	18.08	10.46
Exporters in the group (%)	28.65	50.22	74.99	82.19	90.11	91.82
Average exports per year	0.16e+06	0.67e+06	3.84e+06	9.67e+06	2.44e+07	1.85e+08
Sales per worker	106,851	128,395	195,381	200,709	237,337	294,584
Value added per worker	33,696	39,906	52,784	54,285	64,515	76,845

Source: Own elaboration with unbalanced panel data from the ESEE database. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the *Índice de Precios Industriales* (IPRI), base year 2010.

3.3. Export entry conceptual framework for micro-exporters

To understand the process that governs the different export behavior of small firms and large firms where diverging dynamics such as the SS effect, the LBE effect and the exporter premium are generated, it is important to recognize that the export entry decision of a firm plays a paramount role in shaping the export entry cost. This export entry cost is no longer fixed, but varies according to an endogenous strategic decision on the part of the firm (Arkolakis, 2010). The export entry cost rather than exogenous in nature, therefore not determined by any firm effort, is endogenous to the extent that certain decisions and activities of a firm can increase the probability that it starts to export (Van Beveren and Vandenbussche, 2010).

This thesis proposes an export entry framework where all firms face three decisions before becoming an exporter (Máñez et al., 2009): i) to which country or countries to export, ii) what product/s to export, and iii) how to enter each market by the type of product (distribution channel). These three decisions combined determine the optimal number of consumers reached and subsequently the quantity exported as well as the export entry cost. The export entry conceptual framework for micro-exporters proposes that there are several export entry strategies that help small firm with low productivity and scarce resources to minimize the entry cost required to access the foreign market. These firms do not wait to increase their productivity to be able to absorb the high export entry cost required to become an exporter. Instead they prefer to reduce the export entry cost to start exporting.

For example, a Spanish company can expect to reach more consumers and export larger quantities entering US with an ample portfolio of products catering to the local needs and a network of specialized distributors in each region of the country, rather than just selling a product online in Portugal that works well in Spain and wait for shipping orders to arrive. However, the first option comes at a high cost, and not all firms have the required resources at hand, especially small businesses.

This lack of resources by small firms is known as resources poverty (Welsh and White, 1981). Compared to large firms, small firms are constrained by limited resources. Small businesses are not like large businesses but on a smaller scale, because the very size of a small firm creates special conditions which requires them to employ different strategies and management approaches compared to large firms (Welsh and White, 1981). The availability of resources is also a significant factor to explain the export entry strategy of a firm as seen in figure 4.

Figure 4 shows the export entry conceptual framework for micro-exporters, where small firms tend to have low productivity levels and few resources. If they want to enter the export market they have to select export entry strategies that minimize the resources needed (time, capital, personnel, knowledge, risk) and the export entry cost, so that they can make up for their low productivity and lack of resources.

Following the flow of figure 4, on the one hand, to minimize the export entry cost small firms adopt a combination of three cost-saving export entry strategies which limit exports to a gravitational market, to an existing product and to a distributor network, which severely constrains sales abroad and explains why small firms become micro-exporters. However, by reducing to (almost) a negligible level the resources needed and therefore the export entry cost, the SS effect does not apply to small firms who become micro-exporters, as they no longer require high levels of productivity to absorb large export entry costs. Besides, given the minimal export entry cost attained by micro-exporters there is no export hysteresis as they do not keep on exporting under adverse conditions to avoid paying a large export (re)entry cost again. This lack of export hysteresis facilitates high turnover rates in and out of the international market for micro-exporters, with quick entries and exits from the export activity.

On the other hand, as shown in figure 4, the LBE effect requires new challenges triggered by the interaction with foreign agents and time in order to assimilate and implement new knowledge obtained through the export experience to crystalize into productivity improvements at a firm level (Aw et at., 2005; Andersson and Lööf, 2009). Nevertheless, by selling an existing product to a close market through a distributor, the export activity remains too similar to a domestic sale, diminishing the opportunities that the export activity offers for new learning. At the same time, the lack of export hysteresis among micro-exporters, which creates high turnover rates in and out of the export market, also reduces the exposure period of micro-exporters to international agents and minimizes opportunities for new knowledge acquisition and technology implementation, dwarfing potential gains that might be obtained from the LBE effect.

Figure 4. Conceptual export entry framework for small firms that become micro-exporters

Source: Own elaboration.

As a consequence of the export entry strategy followed by small firms with low productivity and few resources, they become micro-exporters which neither benefit from the SS effect nor from the LBE effect. Therefore, the exporter premium does not apply to micro-exporters and there is no productivity gap between micro-exporters and non-exporters.

To sum up the conceptual framework, the NNTT literature proposes two hypotheses to explain the exporter premium. The SS hypothesis which states that there are entry costs to access the international market and that only the most productive firms can bear these entry costs, leaving firms with low productivity as non-exporters. And the LBE hypothesis which states that exporting increases firms' productivity because it allows companies to learn from international buyers and competitors. However, the data on the Spanish economy shows that most Spanish exporting firms export tiny amounts per year, called micro-exporters, with a high turnover rate in and out of the export market, which contradicts the existence of the SS effect (and the export hysteresis), the LBE effect and, by default, the existence of the exporter premium for micro-exporters, a pillar of the NNTT literature.

From the beginning, scholars of the NNTT literature have been aware of an overrepresentation bias towards large firms in national firm-level databases, given that large companies are easier to survey and that they are more representative of the aggregate economy than small firms. The fact that large firms, on average, tend to be more productive and become (large) exporters has biased the NNTT literature results towards the SS effect, the LBE effect and the exporter premium. In the Spanish case the most renowned firm-level database, called the ESEE, also overrepresents large firms which are highly productive and become large exporters. Therefore, the results obtained from any analysis which employs the whole ESEE database will tend to be biased towards large firms and large exporters, which experience different export dynamics compared to micro-exporters. Due to the fact that small firms tend to have low productivity levels and few resources, to enter the international market they select export entry strategies which minimize the export entry cost to (almost) a negligible level. However, as a result of the export entry strategies followed by small firms, they start by exporting small amounts, becoming micro-exporters and do not benefit neither from the SS effect nor from the LBE effect. This proposition contradicts the existence of the exporter premium for micro-exporters and the existence of a productivity gap between micro-exporters and non-exporters.

4. Research model and variables

Once the NNTT theoretical framework on the exporter premium has been summarized, the relevant empirical literature to the exporter premium reviewed and the export entry conceptual framework for small firms that become micro-exporters introduced, this section presents the research model, the hypothesis to be tested by the empirical analysis, and the variables employed for investigation.

The exporter premium is defined as the, ceteris paribus, performance difference between exporters and non-exporters (Serti and Tomasi, 2008). The performance characteristic most frequently analyzed by the NNTT literature is productivity, so the exporter premium can be described as the higher productivity level of exporters compared to non-exporters which reflects a self-selection process or a learning process at work along with the export activity.

However, if the export entry conceptual framework for small firms is correct and they become micro-exporters, which are neither benefited by the SS effect nor by the LBE effect, the exporter premium does not apply to them and there should be no productivity gap between micro-exporters and non-exporters. Accordingly, the following hypothesis is proposed:

H1: Micro-exporters are no more productive than non-exporters

To test that micro-exporters are no more productive than non-exporters, the average productivity level in year *t* of those firms which do not export during the year, called non-exporters, is compared to the average productivity level in year *t* of those firms that export during the year *t*, called exporters. The productivity differential between both groups of firms is calculated from a regression of log(arithmic) productivity levels on the export status dummy and a set of control variables for each firm (usually including industry and year). The result shows the average percentage difference in productivity between exporters and non-exporters, after controlling for the characteristic included in the vector control (Wagner, 2012).

The proposed research model is as follows:

$$\textbf{(3)} \quad \log P_{it} = \alpha + ß_1 \, Status_{it} + ß_n \, Control_{it} + e_{it}$$

where i is an index for each firm, t is an index for the year of each observation, P is firm productivity and $log\ P_{it}$ is the productivity logarithm for firm i in year t. $Status_{it}$ is a dummy variable for the current export status of the firm. $Control_{it}$ is a vector of control variables for firm i in year t, and e is an error term.

The dependent variable employed as the productivity measure is labor productivity, calculated as sales per worker and value added per worker, which are dependent variables commonly used in the NNTT literature to test the exporter premium hypothesis. Some papers that employ labor productivity as dependent variable to study the exporter premium are Bernard and Jensen, 1995; Bernard and Wagner, 1997; Clerides et al., 1998; Bernard and Jensen, 1999; Girma et al., 2004; ISGEP, 2008; Máñez et al., 2009; Verardi and Wagner, 2011; Minondo, 2014; Máñez et al., 2015; Cruz et al., 2017; Duch and Martens, 2018; and Matthee et al., 2018. Some studies, alternatively, employ total factor productivity (TFP) as the productivity measure. Nonetheless, Bartelsman and Doms (2000) show that heterogeneity in labor productivity is accompanied by similar heterogeneity in TFP. Furthermore, adding control variables such as wage, capital intensity and industry and controlling for firm unobserved heterogeneity helps to control for differences between TFP and labor productivity.

The independent variable of interest is the export status, since the hypothesis test involves checking if micro-exporters are more productive than non-exporters or not. Moreover, to validate if previous papers render biased results as a consequence of biased samples, the exporter premium hypothesis test is extended to all exporters and large exporters to juxtapose the results. The status is a dichotomous variable with value 1 if the firm exports in year t, for each of these five groups of exporters: i) micro-exporters who do not export more than Eur 25,000/year, ii) micro-exporters that do not export more than Eur 50,000/year, iii) all exporters, iv) large exporters who export more than Eur 25,000/year, and v) large exporters that export more than Eur 50,000/year. The independent variable status takes value 0 if the firm does not export in year t, called non-exporter.

A specific criteria is used to define micro-exporters. Firms only need to report exports no higher than Eur 25,000 or Eur 50,000 in year t and in any other consecutive year, to qualify as micro-exporters. This distinction allows to discriminate all those companies that start to export during the final months of year t, so in the subsequent twelve-month period they export more than Eur

25,000 or Eur 50,000, and those companies that become large exporters but not until they have been exporting for two or more years. The Eur 25,000/year and Eur 50,000/year thresholds have been selected given the abundance of exporting firms within these export bands as to date, there has not been any previous categorization of micro-exporters in the relevant literature and a new parametrization standard is therefore required.

All exporters includes all firms who report positive exports in year *t*, no matter the volume exported. Large exporters (as opposed to micro-exporters) includes firms which export more than Eur 25,000 and Eur 50,000 in year *t* or in any other consecutive year. Because of this, the group of micro-exporters which do not export more than Eur 25,000/year (Eur 50,000/year) is complementary to the group of large exporters that export more than Eur 25,000/year (Eur 50,000/year), and the union of both groups integrate the group of all exporters. To make the time series data comparable, the yearly export values in euros have been deflated with an industry index, base year 2010, to create constant values.

The control variables included in the model are frequently used by the NNTT literature and they are required because besides the independent variable (export status) there are other factors that systematically affect the dependent variable (labor productivity) and they must be controlled for. The control variables employed are[3]:

- Wage. The firm wage is calculated as the yearly total labor cost per employee in euros, This includes all salaries, benefits and compensations paid by the firm divided by the average number of workers in the year. Higher wages might be a proxy for higher value added or higher sales margin, and it entails a higher productivity in the form of lower production costs or a higher sales price. Wage is included in the model in its logarithmic form (Wagner, 2007b; ISGEP, 2008; Grublješič and Damijan, 2011).
- Age. The firm age is calculated as the difference between the year *t* and the birth-year reported by the firm. Age equals 1 in the year the company is born. All observations where the company does not report a birth year or reports a birth year younger than the

[3] Another common control variable employed by the NNTT is firm size, measured as the average number of employees per year (Bernard and Wagner, 1997; Isgut, 2001; Alvarez and López, 2005; Haidar, 2012; Bravo et al., 2014; Njikam, 2017). However, after several combinations with other control variables, the control variable size proved to be non-significant and it reduced the goodness-of-fit of the model too. As a result, it was not included as a control variable.

sample year are discarded. If the company reports more than one birth year, the older year is selected. This might happen in case of misreporting or a merger with an older firm. Age is an indicator of survival and for a firm to survive it must have a competitive advantage in the market, linking age to productivity. Moreover, age can be associated with a more advanced position down the learning curve. In both ways (competitive advantage or learning curve) age directly affects productivity. Age is expressed in a quadric form as it is expected that as the firm becomes older the effect on productivity decreases, so it does not have a linear relationship with labor productivity (Clerides et al., 1998; Mengistae and Pattillo, 2004). Age is included in the model in its logarithmic form (Hallward et al., 2002; Fariñas and Martín, 2007; Haidar, 2012; Zhang, 2016).

- Capital. The control variable capital is defined as the annual value of tangible fixed assets per employee in euros. Tangible fixed assets include technical facilities, machinery, tooling, furniture, computer equipment, transport equipment and other tangible fixed assets but not including land and buildings. A higher productive capital stock per employee is associated with higher levels of productivity as workers are at disposal of better means of production, with a positive relationship between capital per worker and productivity. The value of the tangible fixed assets is recorded from 1991 onwards. Capital is included in the model in its logarithmic form (Clerides et al., 1998; Baldwin and Gu, 2003; Mengistae and Pattillo, 2004; Haidar, 2012).
- Foreign. Dummy variable indicating if there is foreign ownership in the firm's equity, with a value of 1 if the foreign ownership is higher than 0 percent of the firm's equity and a value of 0 if the foreign ownership is 0 percent. Foreign ownership might entail technology transfers in the form of licenses, blueprints, experts and machinery made by the foreign investor for the local firm, all positively associated with productivity (Hallward et al., 2002; Mengistae and Pattillo, 2004; Alvarez and López, 2005; Fariñas and Martín, 2007; Barboni et al., 2012; Njikam, 2017).
- Innovation. Innovation is a dummy variable which indicates if the firm is more innovative than the average firm in the same industrial sector *j*. The dummy variable takes value 1 if the firm *i* is more innovative than the average firm in the same industrial sector *j* in year *t* and a value of 0 otherwise. Innovation per firm is calculated as R&D intensity, which is the sum of all the R&D expenditures of a company divided by its

sales per year. A higher R&D intensity than the industry average might involve a higher absorptive capacity on new knowledge, better manufacturing processes and a higher value added for the firm, with a direct impact on productivity (Cassiman and Golovko, 2007; Castellani and Giovannetti, 2010; Ito and Lechevalier, 2010; Máñez et al., 2015; Zhang, 2016; Njikam, 2017).

- Year & industry. Year includes all the years of the sampled period 1990-2015. Every year is different for the manufacturing sector as there are annual macroeconomic factors at a country level such as monetary policies (exchange rate depreciation/devaluation), fiscal policies (tax cuts/increases) and labor policies (labor incentives) that directly affect all manufacturing firm's productivity, meaning that year-to-year variations must be controlled for (Wagner, 2002; Yasar et al., 2006; Serti and Tomasi, 2008; Temouri et al., 2013; Minondo, 2014; Máñez et al., 2015). Then, there are middle and high technology industrial sectors, such as the automotive industry and the electronics industry, with higher productivity than other low technology industrial sectors such as clothing and footwear. Belonging to a middle or to a high technology sector affects the firm productivity and do to this it must be accounted for (Kraay, 1999; Girma et al., 2004; Serti and Tomasi, 2008; Bravo et al., 2014; Duch and Martens, 2018). The combination of both factor variables (year and industry) allows to capture the potential differential effect of the economic cycle on each industry (Correa and Doménech, 2012).

Once the aforementioned variables are included the proposed research model turns as follows:

$$\textbf{(4)}\quad \log P_{it} = \alpha + ß_1\, Status_{it} + ß_2 \log Wage_{it} + ß_3 \log Age_{it} + ß_4 \log Age_{it}{}^2 + ß_5 \log Capital_{it} + ß_6\, Foreign_{it} + ß_7\, Innovation_{it} + \sum ß_8\, Year_t\, Industry_j + e_{it}$$

Table a2 (in annexes) includes common descriptive statistics such as the minimum and the maximum values, the mean, the median and the standard deviation for the variables included in the research model. It also includes extra variables such as: marketing intensity, value added per hour worked and sales per hour worked, employed by the robustness checks of section 6.3.

5. Methodology and data

As reported by the seminal meta-analysis of dozens of NNTT papers elaborated by Wagner (2012) the standard approach to study differences in performance between exporters and non-exporters in the NNTT literature is to use longitudinal panel data for companies, obtained from public statistical services, to document such differences. The analysis of panel data allows us to learn about economic processes while accounting for both heterogeneity across firms and for dynamic effects which are not visible in cross sections (Greene, 2017).

As labor productivity is a continuous variable a pooled linear ordinary least squares (OLS) regression can be run. OLS is a method for estimating the unknown parameters in a linear regression model with the goal of minimizing the sum of the squares of the differences between the observed values of the dependent variable (firm labor productivity as measured in the sample) and the predicted values by the linear function. Visually there is a constellation of observed data points (as per the sample) and a set of estimated points (as per the regression) creating a line with the smallest differences possible between the observed points and the estimated points (Hayasi, 2000).

The control variables are part of the observed heterogeneity on productivity among firms as they can be detected and their incidence on productivity can be measured. However, there might be other factors which simultaneously affect productivity and the export status which are impossible to measure. For instance, a firm could have a talented manager who pursues opportunities in foreign markets and who is also devoted to increase productivity, while other firms may have a conservative and less skilled manager who prefers to focus on the domestic market and who is reluctant to introduce productivity innovations. If this is the case, a positive correlation between export activity and productivity may not be attributed to the former (export activity) but to an unobserved variable (managerial skills) by which there is no data to measure it (García et al., 2012). Without considering these unobserved variables the regression will suffer from an endogeneity bias in the form of the omitted variable bias (Gujarati and Porter, 2008), rendering biased estimates of the exporter premium.

It is possible to select between fixed effects or random effects to introduce the unobserved firm heterogeneity (managerial ability, product attributes, technology) in the model. The use of random effects requires that the unobserved firm effects are uncorrelated with the independent variables. Nevertheless, this assumption is likely violated in the export entry decision model as firm characteristics such as capital intensity, innovation and wage are prone to be correlated with managerial ability, product attributes, technology and other potential unobserved firm effects. Owing to these unobserved characteristics being potentially permanent, or at least highly serially correlated, and likely correlated with the independent variables, fixed effects are selected to model the unobserved firm heterogeneity (Bernard and Jensen, 2004b).

If the degree of correlation between the different independent variables is high enough it can cause problems when fitting the model and interpreting the results. To test for multicollinearity variance inflation factors (VIF) are used, which identify the correlation between the different independent variables and the strength of their correlation. VIF starts at value 1, which indicates that there is no correlation between the independent variables and has no upper limit. A value higher than 5 suggests that there is a moderate correlation, but not too severe. A value higher than 10 indicates serious correlation problems among the independent variables, where the coefficients are going to be poorly estimated and the p-values become questionable (Kutner et al., 2004). For this empirical model the VIF values obtained range from 2.00 to 3.00, which confirms that the correlation among the different independent variables is low.

After testing for groupwise heteroskedasticity (modified Wald test) and serial correlation (Wooldridge test) the results obtained lead us to reject the null hypothesis of homoscedasticity (or constant variance) and no serial correlation. With heteroskedasticity or serial correlation the OLS estimators, whilst still centric and consistent, are no longer best linear unbiased estimates (BLUE). In the absence of homoscedasticity or no serial correlation there might be a substantial loss in efficiency using the OLS regression and, more importantly, the bias in the estimated standard errors may lead to invalid inferences (Wooldridge, 2012). To correct this bias, the regression analysis employs robust estimators.

Furthermore, in a sample which comprises of heterogeneous firms such as the ESEE subsample employed for testing, frequently the values of a few firms are extremely away from the observations of most other firms. These observations are called outliers and they might be the result of reporting errors, idiosyncratic events or a diverging firm behavior, for which most likely there is no possibility to assess the veracity of the observation. Whatever the reason, these extreme values may have a strong influence on: i) the variable mean value calculated from the sample, ii) the tails of the distribution of the variable, and iii) the estimates of the exporter premium (Wagner, 2012). Therefore, the productivity difference between exporters and non-exporters can be greatly influenced by a minority of firms with extremely high or low values (outliers). Nevertheless, robust estimators for panel data with fixed effects have been proposed by Bramati and Croux (2007) to tackle both unobserved firm heterogeneity and the presence of outliers in the sample as outliers can significantly alter the results from an empirical study (Verardi and Wagner, 2011; Verardi and Wagner, 2012).

The estimated coefficient $ß_1$ expressed as 100 x (exp($ß_1$)-1) is the exporter premium expressed in percentage and shows the average percentage labor productivity difference between exporters and non-exporters, after controlling for the characteristics included in the vector *Control*, the effect of outliers and unobserved heterogeneity through the fixed effects (ISGEP, 2008).

To alleviate the large-firm overrepresentation problem which biases firm-level national statistical databases, the analysis focuses on the specific data concerning micro-exporters and non-exporters, while it also includes other exporters to check the validity of the exporter premium for large exporters. By focusing the analysis on micro-exporters' data it could be expected that the results obtained conform better to their specific reality, supported by an export entry conceptual framework which allows to explain why firm heterogeneity crystalizes into different export entry patterns that render different results such as the existence or not of the exporter premium and setting apart micro-exporters from other exporters. All information where a firm reports a year of creation later than the year the information is reported, or where the information about its export status and the value exported is not congruent, is discarded.

The data comes from the already mentioned *Encuesta sobre Estrategias Empresariales* (ESEE), the Survey on Business Strategies. The ESEE sample is composed of Spanish manufacturing firms with 10 or more employees. It starts in the year 1990, when 2,188 firms were sent a questionnaire which contained over 100 questions with more than 500 specific fields. The survey also includes information on the firms' balance sheet and their profit and loss statements.

The ESEE is the most frequently employed Spanish firm-level database within the NNTT to test the exporter premium hypothesis. Empirical papers on the Spanish economy mentioned previously in this chapter such as Delgado et al., 2002; Fariñas and Martín, 2007; Blanes et al., 2008; ISGEP, 2008; Cassiman et al., 2010; and Máñez et al., 2015, use the ESEE to analyze the exporter premium.

The 1990 sample contacted firms with more than 200 employees, called large firms, with exhaustiveness, reaching an average reply level of 70 percent. Firms with 10 to 200 workers, called small firms, were sampled with a stratified, proportional and systematic sampling method with a random seed which comprises of approximately 5 percent of the total population of small firms. Firms with less than 10 employees were not included in the sample. After 1990, the ESEE has paid special attention to keep the representativeness of the original sample by minimizing its deterioration. Firms exiting the sample is a frequent problem due to various factors: stopping collaboration, closure, liquidation, changing to a non-manufacturing activity and disappearance through merger or acquisition. The replacement by new firms is necessary to avoid shortening the sample coverage across industries and size segments. Nevertheless, this constant replacement of firms creates an unbalanced panel of companies as depicted in table 6 which contains all the firms sampled by the ESEE which enter, exit and continue in the sample per year.

Table 6. Number of firms that enter, exit and continue in the ESEE database per year, period 1990-2015

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
No. firms	2,188	2,059	1,977	1,869	1,876	1,702	1,716	1,920	1,776
Exit the sample	-	300	161	209	148	183	119	120	156
Enter the sample	-	171	79	101	155	9	133	324	12
Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
No. firms	1,754	1,870	1,724	1,708	1,380	1,374	1,911	2,023	2,013
Exit the sample	145	120	177	89	328	6	97	195	131
Enter the sample	123	236	31	73	0	0	634	307	121
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	
No. firms	2,009	2,015	2,006	1,816	1,869	1,683	1,525	1,666	
Exit the sample	160	218	198	190	211	186	159	121	
Enter the sample	156	224	189	0	264	0	1	262	

Source: Own elaboration with unbalanced panel data from the ESEE database for the period 1990-2015. No. of firms includes the number of firms who answer the questionnaire per year. Exit the sample includes firms who reply the questionnaire the previous year but not the current year. Enter the sample includes firms which reply the questionnaire for the first time.

The ESEE includes 20 two-digit Spanish manufacturing industrial sectors *j* defined by the *Clasificación Nacional de Actividades Económicas* (CNAE), the National Classification of Economic Activities, following its latest update in 2009. Following the standard procedure within the NNTT, monetary values in euros have been deflated by the *Índice de Precios Industriales* (IPRI), the Industrial Price Index for the Spanish manufacturing sector, base year 2010, to be expressed in constant values and avoid biases which might arise because of inflation (Vu et al., 2016). This deflation index includes different index numbers per year for each of the 20 industries *j* to account for differences in the inflation rate among industrial sectors.

The ESEE database contains an unbalanced panel of 210 micro-exporters that do not export more than Eur 25,000/year (513 observations), 336 micro-exporters that do not export more than Eur 50,000/year (989 observations), 2,698 non-exporters (17,554 observations) and 3,368 exporters (28,963 observations) as presented in table 7.

Table 7. Number of micro-exporters, exporters and non-exporters sampled by the ESEE database per year, period 1990-2015

Year	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Micro-exporters <= €25,000/year	29	23	26	15	16	14	16	19	17
Micro-exporters <= €50,000/year	53	46	49	39	37	31	29	30	29
All exporters	1,025	1,027	1,023	980	1,047	1,006	1,023	1,165	1,137
Non-exporters	1,135	987	908	859	823	678	668	696	638
Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Micro-exporters <= €25,000/year	14	14	15	14	6	8	11	22	24
Micro-exporters <= €50,000/year	27	30	30	29	14	16	28	41	46
All exporters	1,086	1,191	1,101	1,098	885	883	1,168	1,246	1,235
Non-exporters	645	636	588	609	494	489	682	772	749
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	
Micro-exporters <= €25,000/year	28	26	27	23	32	25	22	27	
Micro-exporters <= €50,000/year	47	49	54	50	57	43	40	45	
All exporters	1,241	1,279	1,316	1,225	1,265	1,168	1,106	1,037	
Non-exporters	712	701	688	588	534	492	417	366	

Source: Own elaboration with unbalanced panel data from the ESEE database. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Due to the fact that the group of exporters who export more than Eur 25,000/year (Eur 50,000/year) is complementary to the group of micro-exporters who do not export more than Eur 25,000/year (Eur 50,000/year), the number of firms which make up the group of large exporters can be calculated as the difference between all exporters and micro-exporters.

6. Results

6.1. Descriptive analysis

A descriptive analysis of twelve firm performance characteristics plus age, frequently employed by the NNTT literature as found in Bernard and Jensen, 1995; Bernard and Wagner, 1997; Girma et al., 2004; Arnold and Hussinger, 2005; Greenaway et al., 2005; Hahn, 2005; Fariñas and Martín, 2007; Blanes et al., 2008; Fryges and Wagner, 2008; Ito and Lechevalier, 2010; Yang and Mallick, 2010; Temouri et al., 2013; Cruz et al., 2017; and Njikam, 2017, concurs with the assumption made in the conceptual framework which states that small firms who become micro-exporters tend to have lower productivity levels and less resources than large firms that become large exporters.

As depicted in table 8 there is a clear relationship between firm size, measured as average employment per year, export status (non-exporters, micro-exporters, all exporters and large exporters) and labor productivity, measured as: i) value added per worker, ii) sales per worker, iii) value added per hour worked, and iv) sales per hour worked. As predicted by the conceptual framework, the ESEE data shows that micro-exporters do not have better performance characteristics than non-exporters as they are, on average, smaller in terms of employment and sales, less capital intensive, less labor productive, pay lower wages, they have less foreign ownership and invest less in R&D than non-exporters and also than large exporters.

On average, as shown in table 8, micro-exporters employ twice less employees, they sell three times less and pay wages that are 5 percent lower. They have 10 percent less labor productivity and proportionally invest twice as less in R&D than non-exporters do. They are 25 percent less capital intensive and they have ten times less foreign investment in their capital than non-exporting firms. Micro-exporters only surpass non-exporters in marketing intensity, where they invest proportionally a little bit more.

When compared to all exporters and large exporters, as shown in table 8, micro-exporters possess even worse performance characteristics because they employ thirteen times less employees and sell thirty times less, they pay 50 percent lower wages, they have half the labor productivity, they invest proportionally four times less in R&D and 50 percent less in marketing, they are twice as less capital intensive and they have eighty times less foreign investment in their capital compared to large exporters and all exporters. What is more, they are 13 years younger.

Table 8. Average performance characteristics in year *t* for different export status groups for the period 1990-2015 (constant values in euros)

Firm performance characteristic	Export status					
	Micro-exporters <= €25,000	**Micro-exporters <= €50,000**	**Non-exporters**	**All exporters**	**Large exporters > €25,000**	**Large exporters > €50,000**
Employees (size) $_t$	28	27	59	357	363	369
R&D/sales $_t$	0.27%	0.24%	0.54%	1.04%	1.06%	1.07%
Marketing/sales $_t$	1.03%	0.95%	0.75%	1.54%	1.55%	1.56%
Capital/worker $_t$	43,758	46,047	56,096	107,548	108,662	109,658
Sales $_t$	3.21e+06	3.06e+06	1.07e+07	1.03e+08	1.05e+08	1.07e+08
Sales/worker $_t$	85,790	98,045	108,101	214,177	216,499	218,287
Sales/hour $_t$	48.82	56.31	61.39	123.14	124.45	125.45
Wage/worker $_t$	23,609	24,307	25,275	35,362	35,575	35,753
Wage/hour $_t$	13.57	14.00	14.48	20.36	20.48	20.58
VA/worker $_t$	33,131	34,331	36,371	57,167	57,598	57,974
VA/hour $_t$	18.87	19.57	20.62	32.70	32.94	33.15
Foreign $_t$	0.19%	0.59%	2.85%	24.82%	25.26%	25.68%
Age $_t$	21	23	22	35	35	36
No. firms	210	336	2,698	3,368	3,158	3,032

Source: Own elaboration with unbalanced panel data from the ESEE database for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. No. firms includes the maximum number of unique firms per group in the sample.

Performing a t-test to compare the differences in the mean value of the twelve performance characteristics between different groups of exporters to non-exporters, the results are revealing. From the twelve performance indicators, only the R&D/sales mean value for micro-exporters does not statistically differ from non-exporters, while all the other eleven indicators statistically differ. On average, micro-exporters have worse performance characteristics than non-exporters. However, doing the t-test to compare the group of all exporters and large exporters to the group of non-exporting firms, all twelve performance indicators statistically differ, suggesting that, on average, all exporters and large exporters have more resources and higher productivity levels than non-exporters.

It is interesting to note how the performance characteristics improve for each group of exporters as, moving from left to right in table 8, the export status goes from micro-exporters to non-exporters, to all exporters, to large exporters. The data contained in the ESEE for the period 1990 to 2015 is in line with the hypothesis that micro-exporters do not enjoy the exporter premium and the prediction that micro-exporters have no better performance characteristics than non-exporters. Specifically, micro-exporters do not have higher labor productivity levels measured as sales per worker, value added per worker, sales per hour worked and value added per hour worked, than non-exporters. However, there is a great deal of heterogeneity among industrial sectors and firms, so a thorough econometric analysis is required to identify and isolate all other factors which might be polluting the comparison between micro-exporters and non-exporters.

6.2. Empirical results

With an unbalanced panel data from the ESEE database for the period 1990-2015, running a robust regression with fixed effects and sales per worker as the dependent variable the results obtained are included in table 9. The variable status, which measures the exporter premium, as expected, is positive for all groups of exporters but not significant for micro-exporters which do not export more than Eur 25,000/year, consistent with the export entry conceptual framework. For micro-exporters which do not export more than Eur 50,000/year the exporter premium is positive and significant, although it is lower and less statistically significant than for all exporters and large exporters. The results presented in table 9 are aligned with the lack of the exporter premium among micro-exporters.

Table 9. OLS robust regression with fixed effects for the export premium, dependent variable sales per worker

Variable	Export status				
	Micro-exporters <= €25,000	Micro-exporters <= €50,000	All exporters	Large exporters >€25,000	Large exporters >€50,000
Robust values					
Status $_t$	.018	.042**	.068***	.075***	.076***
	(0.91)	(2.47)	(4.82)	(4.75)	(4.43)
Wage $_t$	.552***	.555***	.549***	.549***	.547***
	(17.80)	(18.23)	(24.80)	(24.61)	(24.34)
Age $_t$	.273***	.270***	.376***	.382***	.386***
	(3.23)	(3.23)	(6.34)	(6.36)	(6.38)
Age $_t^2$	-.110***	-.110***	-.157***	-.159***	-.160***
	(-3.75)	(-3.79)	(-8.01)	(-8.00)	(-8.01)
Capital $_t$	.067***	.068***	.053***	.053***	.052***
	(6.74)	(6.88)	(7.39)	(7.38)	(7.24)
Foreign $_t$	.036	.034	.032*	.032*	.032*
	(0.71)	(0.66)	(1.81)	(1.80)	(1.80)
Innovation $_t$	.057*	.059*	.027***	.026***	.026***
	(1.71)	(1.80)	(2.77)	(2.72)	(2.67)
Constant	5.198***	5.149***	5.650***	5.614***	5.634***
	(13.57)	(13.79)	(18.52)	(18.43)	(18.41)
Year and industry effect	Included	Included	Included	Included	Included
N	2,464	2,491	4,660	4,637	4,610
Observations	16,547	16,991	43,807	43,331	42,887
Adj. R squared	0.8858	0.8861	0.9002	0.9001	0.8999

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

The control variables age (with a quadratic form), capital intensity and wage, as expected and reported by the NNTT literature, have a positive and statistically significant effect for all groups of exporters, supporting; the proposition that firms which are older, more capital intensive and pay better wages, have higher labor productivity levels. These control variables, as mentioned before, have a positive relationship on productivity as higher wages are associated with better skilled and more productive workers (ISGEP, 2008), age is associated with a competitive advantage or a more advanced position down the learning curve (Roberts and Tybout, 1997) and capital intensity is associated with ample internal resources and better technology (Yun, 2018). Age is said to have a positive effect on productivity as it has an increasingly increasing positive effect on productivity for all groups of exporters over the first 16 to 17 years of activity and a decreasingly increasing effect on productivity for all groups of exporters until the firm reaches a longevity close to 250 years old. From that point forward, age has a negative effect on productivity. Figure a1 (in annexes) graphically describes the effect of age on productivity, when productivity is measured as sales per worker.

Innovation intensity has a positive and significant effect for all groups of exporters as expected and predicted by the relevant literature, while foreign ownership has a positive effect for all groups of exporters but it is only significant for all exporters and large exporters. This lack of statistical significance of the control variable foreign ownership among micro-exporters might be explained by the low levels of foreign ownership registered for micro-exporters and non-exporters as shown in table 8. Therefore, even if foreign investment in the company assets has a positive effect on a firm´s labor productivity, given the low levels listed, it does not have a significant impact on productivity.

It must be said that the combined factor variable year and industry is relevant after performing a joint significance test and that the goodness-of-fit of the linear model, measured as adjusted R-squared, increases for all groups of exporters when the combined factor variable is included. Moreover, the goodness-of-fit is higher for all groups of exporters when the combined factor variable is included versus including both factor variables (year and industry) but not combined.

With the same unbalanced panel data for the period 1990-2015, running a robust regression with fixed effects and, this time, with value added per worker as the dependent variable, the results obtained are included in table 10. The labor productivity gap between non-exporting firms and micro-exporters is positive but not statistically significant as predicted by the conceptual framework. Meanwhile, the labor productivity difference for all exporters and large exporters compared to non-exporters is positive and statistically significant as stated by the NNTT literature. The more pronounced labor productivity difference when the dependent variable is measured as sales per worker between exporters and non-exporters than when the dependent variable is measured as value added per worker might indicate a more intermediate-intensive production structure of exporters relative to non-exporters (Hahn, 2005).

Table 10. OLS robust regression with fixed effects for the exporter premium, dependent variable value added per worker

Variable	Export status				
	Micro-exporters <= €25,000	Micro-exporters <= €50,000	All exporters	Large exporters >€25,000	Large exporters >€50,000
	Robust values				
Status $_t$	.010	.035	.028**	.031**	.027*
	(0.30)	(1.43)	(2.14)	(2.20)	(1.77)
Wage $_t$	.750***	.752***	.636***	.633***	.631***
	(20.42)	(20.86)	(23.79)	(23.59)	(23.30)
Age $_t$	.237**	.233**	.277***	.284***	.284***
	(2.17)	(2.16)	(3.82)	(3.86)	(3.84)
Age $_t^2$	-.075**	-.071*	-.097***	-.098***	-.099***
	(-1.98)	(-1.94)	(-4.31)	(-4.34)	(-4.33)
Capital $_t$	.033***	.032***	.037***	.036***	.036***
	(2.83)	(2.80)	(4.31)	(4.24)	(4.23)
Foreign $_t$	-.023	-.025	.032	.032	.032
	(-0.49)	(-0.53)	(1.59)	(1.57)	(1.58)
Innovation $_t$	-.006	-.005	.010	.010	.010
	(-0.19)	(-0.16)	(0.87)	(0.84)	(0.85)
Constant	2.136***	2.140***	3.568***	3.597***	3.622***
	(4.47)	(4.78)	(11.21)	(11.26)	(11.27)
Year and industry effect	Included	Included	Included	Included	Included
N	2,452	2,479	4,650	4,627	4,600
Observations	16,318	16,762	43,317	42,850	42,406
Adj. R squared	0.6371	0.6373	0.6556	0.6571	0.6567

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * $p < .10$ (two-tailed tests), ** $p < .05$ (two-tailed tests), *** $p < .01$ (two-tailed tests).

Again, age (with a quadratic form), capital and wage have a positive and significant effect on labor productivity for all groups of exporters as predicted by the NNTT theory, where older and more capital intensive firms which pay better wages tend to have higher levels of labor productivity. Age has an increasingly increasing positive effect on productivity during the first 25 to 45 years of activity and a decreasingly increasing effect on productivity until the firm reaches a severe longevity, above 715 years old. From that point forward, age has a negative effect on productivity. Figure a2 (in annexes) graphically describes the effect of age on productivity, when productivity is measured as value added per worker.

The control variables foreign ownership and innovation intensity are still positive as expected, but become non-significant for all exporters and large exporters. For micro-exporters, both control variables become negative and remain non-significant. This might be explained if both foreign ownership and innovation increase the volume of sales but do not increase the sales margin, perhaps because the firm cannot significantly increase its markups in competitive markets. For instance, the implementation by a micro-exporter of a new design which customers prefer more might increase the volume of sales but at the same time it might raise the average cost. If the micro-exporter cannot increase its markups in a highly competitive market, selling more of a more costly product at the same price reduces the sales margin and the value added per worker.

It must be pointed out that the combined factor variable year and industry is relevant after performing a joint significance test and that the goodness-of-fit of the linear model, measured as adjusted R-squared, increases for all groups of exporters when the combined factor variable is included. What is more, the goodness-of-fit is higher for all groups of exporters when the combined factor variable is included versus including both factor variables (year and industry) but not combined.

Table a3 and table a4 (in annexes) contain the correlation matrix for the variables included in the research model. It is worth mentioning that few variables show a high degree or correlation (higher than 0.500). Among them is age and age squared (0.9) which is not surprising, labor productivity and wage (0.6), labor productivity and capital per worker (0.5) and wage and capital per worker (0.5) when labor productivity is calculated as sales per worker or value added per worker for all groups of exporters versus non-exporters.

To sum up, the results obtained through descriptive statistics and the regression analysis are in line with the hypothesis that micro-exporters are no more productive than non-exporters, sustaining the hypothesis that micro-exporters do not enjoy the exporter premium. As predicted by the NNTT literature, the data is aligned with the hypothesis that the average exporter is more productive than the average non-exporter. It can also be concluded that there is a continuum where micro-exporters do not enjoy the exporter premium although the larger the exporter becomes, the higher the exporter premium experiences. This is reasserted by a graphical comparison of the labor productivity distribution functions for different groups of exporters (micro-exporters, all exporters and large exporters) as shown in figure a3 and figure a4 (in annexes) following the formulation of Delgado et al., (2002) as per addendum a1 (in annexes).

6.3. Robustness checks

To check the robustness of the results the regression analysis is repeated with three different robustness checks.

The first robustness check replaces the innovation control variable for a marketing control variable, where marketing is a dummy variable which indicates if the firm is more marketing intensive compared to the average firm in the same industrial sector *j*. Marketing intensity per firm is calculated as the sum of all the marketing expenditures of a company divided by its sales per year. These marketing costs include advertising, promotion and public relations. The dummy variable takes value 1 if the firm *i* is more marketing intensive than the average firm in the same industry sector *j* in year *t*, and a value of 0 otherwise. A higher marketing intensity than the industry average helps a firm to differentiate its products and builds a strong reputation around its brand which increases the company negotiation power with customers and improves its sales margin with a direct impact on productivity (García et al., 2012). Replacing the innovation control variable with a marketing control variable, the research model can be rewritten as follows:

$$\textbf{(5)}\quad \log P_{it} = \alpha + ß_1\,\text{Status}_{it} + ß_2 \log \text{Wage}_{it} + ß_3 \log \text{Age}_{it} + ß_4 \log \text{Age}_{it}{}^{2} + ß_5 \log \text{Capital}_{it} + ß_6\,\text{Foreign}_{it} + ß_7\,\text{Marketing}_{it} + \sum ß_8\,\text{Year}_t\,\text{Industry}_j + e_{it}$$

Previous results are highly consistent to this robustness check. As shown in table a5 and table a6 (in annexes) the control variables and the constant do not experience any relevant changes in their estimators or their significance levels, except for the control variable marketing which is replacing innovation. A significant change is defined as a deviation higher than 1 percent in the estimator values of section 6.2, which measure the independent variable effect on labor productivity. When the dependent variable is sales per worker, marketing is positive and significant for all groups of exporters as predicted by the NNTT literature and the effect on labor productivity is higher than innovation. This means that marketing expenditure has a higher return on investment (ROI) compared with innovation to increase the sales of a firm. This is a plausible explanation as marketing efforts are usually targeted to increase sales. Whereas innovation might be aimed towards reducing the production cost or promote occupational safety, among other goals. When the dependent variable is value added per worker, the variable marketing becomes positive for micro-exporters as expected, but it is still not statistically significant for any group of exporters. This might be explained if marketing intensity increases the volume of sales but does not increase significatively the sales margin, perhaps because the firm cannot increase its markups in a very competitive market.

The second robustness check redefines the dependent variable labor productivity which is calculated as sales per worker and value added per worker, as sales per hour worked and value added per hour worked, calculated as sales or value added divided by the yearly effective hours of work (Fariñas and Martín, 2007). Average employment per year and yearly effective hours of work are highly correlated. It is therefore unsurprising that previous results remain highly robust. The only major change in the estimators values which affects the control variable wage per worker, which slightly reduces its effect on labor productivity. This small difference might be attributed to the fact that the productivity unit of measurement for the dependent variable labor productivity is no longer the employee, but the hours worked, and the relationship between the control variable wage per worker and labor productivity becomes less strong. Table a7 and table a8 (in annexes) include the results obtained.

The third robustness check increases the threshold of foreign ownership in a firm's equity to redefine the foreign control variable. The dummy variable takes a value of 1 if the foreign ownership is equal or higher than 25 percent of the firm's equity, and a value of 0 if foreign ownership is lower than 25 percent (Blanes et al., 2008). These results are highly consistent. When the dependent variable is sales per worker, the foreign ownership effect on productivity remains positive for all groups of exporters and non-significant for micro-exporters. When the dependent variable is value added per worker, foreign ownership remains negative for micro-exporters and positive for all exporters and large exporters and still non-significant for all groups of exporters. This information is included in table a9 and table a10 (in annexes). Furthermore, the regression has been run setting the foreign ownership threshold at 10 percent and at 50 percent levels and again, the results remain highly consistent.

To sum up the empirical results of the exporter premium on micro-exporters, the descriptive analysis of eleven firm performance indicators per group of exporters shows that micro-exporters, on average, are no better firms than non-exporters, while all exporters and large exporters outperform non-exporting firms, supporting the conceptual export entry framework proposition. Specifically, micro-exporters have lower labor productivity levels than non-exporters and large exporters. The outcome of running a robust regression indicates that micro-exporters have no better labor productivity than non-exporters, while all exporters and large exporters have higher labor productivity levels. This is reconfirmed with three robustness checks, which render highly consistent results that are in line with the hypothesis which micro-exporters do not enjoy the exporter premium. Furthermore, a graphical comparison of productivity levels for different groups of exporters through the distribution functions reasserts the hypothesis that micro-exporters do not have higher productivity levels than non-exporters, and supports the existence of the exporter premium for all exporters and large exporters. Therefore, the results validate the hypothesis proposed by the conceptual framework that micro-exporters do not enjoy the exporter premium, while it support the exporter premium hypothesis for all exporters and large exporters, as predicted by the NNTT literature.

7. Conclusions

7.1. Conclusions and limitations of the study

The mainstream NNTT has as a central pillar of thought that exporters have superior performance characteristics such as size, capital intensity, innovation intensity and, more specifically, a higher productivity level compared to non-exporters, known as the exporter premium. The exporter premium is a consequence of the most productive firms self-selecting into the export market given the existence of high export entry costs (known as the self-selection effect) and a consequence of a learning mechanism triggered by the export activity which improves firm's productivity through the continuous learning of new techniques and technologies from foreign agents (known as the learning by exporting effect).

However, more recently, the NNTT literature has found that many firms export tiny amounts (Eaton et al., 2011) and that countries have granular export structures (Lucio et al., 2017; Bernard et al., 2018), with an extreme concentration of trade across few big firms which coexist with a large mass of smaller firms that export very little. Chapter I proposes a conceptual framework where a large group of small firms with low productivity and scarce resources access the international market by selecting export entry strategies which reduce the export entry cost to a negligible level, but which severely limit the volume being exported. These firms are called micro-exporters and given their low productivity levels and their negligible export entry costs, they are no longer subject to the SS effect nor to the export hysteresis.

Furthermore, given the export entry strategy selected by these firms, the export activity remains similar to a domestic sale, diminishing opportunities for new learning, at the same time that the lack of export hysteresis. This creates high turnover rates in and out of the export market, reduces the exposure period of micro-exporters to foreign agents and minimizes potential LBE benefits gained through knowledge acquisition and technology implementation obtained from international markets. Logically, if micro-exporters do not benefit neither from the SS effect nor from the LBE effect, the exporter premium should not apply to them and there should be no productivity differences between micro-exporters and non-exporters. Accordingly, the hypothesis that micro-exporters do not have higher productivity levels compared to non-exporters is proposed and validated with an unbalanced panel data of approximately 1,800 Spanish manufacturing firms per year for the period 1990 to 2015, contesting the existence of the exporter premium hypothesis among micro-exporters.

Chapter I also proposes that the NNTT ironclad consensus around the existence of the exporter premium (Wagner, 2012) can be explained by a bias in firm-level datasets collected by national statistical offices which are employed by the NNTT empirical literature to study the exporter premium hypothesis. These databases overrepresent large firms, as they are easier to identify and contact, and they are more representative of the whole economy than small firms. However, large firms tend to be highly productive and become (large) exporters, obtaining biased results which better represent the export dynamics of large exporters such as the SS effect, the LBE effect, and the exporter premium. The large-firm overrepresentation bias is validated with the ESEE, the Spanish firm-level database par excellence, where firms which export less than Eur 50,000/year are underrepresented by a factor of six compared with reality. When this bias is accounted for, and micro-exporters are analyzed isolated from the bulk of exporters, the results show that micro-exporters have no better performance characteristics than non-exporters. Specifically, they are no more labor productive than non-exporters, contradicting the existence of the exporter premium. Chapter I complements the current NNTT literature by filling a great gap created by micro-exporters, which in fact constitute the majority of exporters in many countries, in the belief that not only the tallest trees make the forest.

The proposed export entry conceptual framework and the results on the exporter premium for micro-exporters complement the latest developments in the NNTT literature. For instance, the new export dynamics where firms start by exporting small amounts, often exporting just one product to one country and having a short survival span in the export market, with not enough time to develop a large demand in the foreign market (Ruhl and Willis, 2017). By incorporating the export dynamics of micro-exporters, which represent the majority of exporting firms in many countries, Chapter I expands the existing international trade theory by integrating a neglected group of exporters within the current NNTT literature. At the same time, Chapter I supports the traditional NNTT literature by validating the existence of the exporter premium when the biased data for all exporters and large exporters is analyzed. The results suggest that all exporters and large exporters have better performance characteristics and, as a result, they are more labor productive than non-exporters, as the NNTT literature predicts.

Needless to say, the performed analysis on the exporter premium for micro-exporters is not free from limitations. First of all, the sample of firms only includes one country, Spain, so the hypothesis should be tested on other countries to corroborate the results. Second, the sample only covers manufacturing firms, whereas certain attributes of the international trade of services such as intangibility and inseparability, diverge from those attributes of manufactured products and might influence the export entry strategies of services exporters (Love and Ganotakis, 2013). And third of all, the ICEX database only reports information on firms' entry and exit from the international market clustered by transitions within different groups of exported volumes. Do to this, a precise account of firm entry and exit turnover from the export market cannot be presented, despite several unsuccessful requests to the ICEX statistical department to share the disaggregate data.

7.2. Business strategy implications, economic policy implications and avenues for further research

The lack of the exporter premium for micro-exporters suggests that (almost) all firms can access the international market regardless of their productivity level and the resources available, if they approach export entry in a cautious way through the right export entry strategy, by exporting what they have to a gravitational market via a distributor. Nevertheless, firm managers and owners must be very down-to-earth about their expectations on an international venture, as most likely export volumes will be low and the export experience short-lived with no learning from the export activity attached.

Regarding the business strategy implications, this view is congruent with both the normative trade theory, where firms choose an optimal export entry strategy by analyzing costs, risks, internal resources, and foreign market characteristics (Hood and Young, 1979), and with the renowned Uppsala model of the late 70s which sets forth an "ad hoc" internationalization process which seems to contradict the normative trade theory.

According to the Uppsala model of Johanson and Vahlne (1977), companies often begin their internationalization process through contracts with intermediaries (or agents), who represent them in foreign countries close in psychic distance to the domestic market. As exports grow, firms replace agents for their own salesforce and gradually enter other markets further away in psychic distance. This is to a point where firms begin manufacturing in foreign markets to overcome trade barriers, in a continuous cycle of increasing foreign market experience and commitment as long as performance and prospects in the international market are favorable (Johanson and Vahlne, 1977).

The Uppsala internationalization process can be reconciled with the normative trade theory through the export entry conceptual framework for small firms with low productivity and few internal resources, which is based on strategies which minimize the cost, risk and internal resources required to enter foreign markets.

In a recent revisit of the model, Johanson and Vahlne (2009) incorporate the importance of networks in the internationalization of firms and conclude that it takes time and effort, up to five years, to create a functional network in a foreign market. And only after many attempts fail as a result of the considerable investment required to overcome the psychic distance and the liability of the outsider[4]. This view is also congruent with the high turnover rates in and out of the international market experienced by new small exporters.

Therefore, managers and owners of small firms must set low expectations when they start to export, as it is very plausible that during their first years the exported volume will be very low and the profitability of the internationalization process in question, discouraging many companies from continuing to export.

Regarding economic policy, in recent years international trade theory has come to accept that exporters are winners, and as a result are better firms than non-exporters. Owing to this, they must be promoted to benefit social welfare, because exporters generate more and better paid employment and they increase the aggregate national productivity. However, given the granularity of exports, many exporters are in fact micro-exporters, firms which export intermittently very small quantities and whose performance does not diverge much from non-exporters. In this regard, export promotion programs (EPP) such as subsidized market research and international fairs participation are only rational if they are channeled exclusively to potential mid-sized exporters. Prospective micro-exporters would not benefit from the export experience to improve productivity and worker’s welfare, while potential large exporters do not require export promotion subsidies to start (or remain) exporting (Much and Schaur, 2018). Therefore, as a rule of thumb for export promotion agencies (EPA), to distinguish between potential micro-exporters and potential mid-size exporters during the internationalization inception phase, firms with few employees, low labor

[4] Psychic distance is defined as any factor that makes it difficult for a firm to understand a foreign environment, such as a lack of knowledge about language, laws and rules. The liability of the outsider is defined as any hardship faced by a firm that attempts to enter a foreign market where it has no relevant position.

productivity and little investment in R&D and marketing compared to their peers, should be under suspicion of becoming micro-exporters.

The analysis of the exporter premium on micro-exporters opens the door for further research in multiple directions. The first avenue of further research is to check if micro-exporters do not enjoy the exporter premium because: i) there is no SS effect, ii) there is no LBE effect, or iii) a combination of both factors. These examinations are presented in Chapter II and Chapter III, respectively.

Moreover, it might be important to corroborate if the conceptual framework for micro-exporters applies in other countries rather than Spain. The Spanish productive sector is quite special in the sense that it is composed of a majority of small companies with very few employees. According to *Retrato de la PYME* from the *Directorio Central de Empresas* (DIRCE), the Portrait of the SME from the Central Business Register, in 2015, 56 percent of Spanish firms were integrated with one self-employed worker (1.8 million firms), and more than 95 percent had less than 10 employees (3.1 million firms). At the same time, the Spanish productive sector is participated mainly by medium and low technology firms which compete in sectors such as food and beverages industries. Both characteristics of the Spanish economy, together or isolated, might impact on how exporters, at a national level, decide to enter the international market.

Furthermore, new case studies focused on micro-exporters, taking into account the export entry conceptual framework for small firms with low productivity and scarce resources, would be very helpful to better understand the causes and consequences for micro-exporters when they enter the international market, and it could further expand the understanding on how small firms operate within the export market.

Annexes

Table a1. Summary of the relevant NNTT literature to the exporter premium

Year	Author/s	Data	Methodology	Results for the exporter premium
1995	Bernard and Jensen	56,000 US manufacturing firms for the period 1976-1987. Plants with more than 250 employees are sampled with certainty, others with probability <1	Descriptive statistics OLS regression	Exporters are larger in terms of sales and employment, pay higher wages, are more productive and more capital intensive. Exporters have better performance characteristics than non-exporters, specifically, higher labor productivity levels measured as valued added per worker and sales per worker. The authors find evidence in favor of the exporter premium
1997	Bernard and Wagner	Near 4,330 Lower Saxony (Germany) manufacturing plants with at least 20 employees for the period 1978-1992	Descriptive statistics OLS regression	Exporters are larger, more capital intensive, employ more white collar workers and they are more labor productive than non-exporters measured as valued added per worker and sales per worker. Their results support the exporter premium hypothesis
1998	Clerides, Lach and Tybout	Colombian plants with at least 10 workers for the period 1981-1991, for Mexico 2,800 large firms for the period 1986-1990, and for Morocco firms with at least 10 workers for the period 1984-1991. All export-oriented industrial plants	Probit model	Plants which begin exporting tend to have relatively lower average variable cost and higher labor productivity levels, measured as sales per worker, than non-exporters. These results validate the existence of the exporter premium, this is, the higher productivity level of exporters compared to non-exporters

1999	Bernard and Jensen	50,000-60,000 US manufacturing firms for the period 1984-1992. Plants with more than 250 employees are sampled with certainty, others with probability <1	OLS regression	Exporters are larger, more capital intensive, pay higher wages and they have higher productivity levels, measured as TFP and labor productivity by value added per worker, than non-exporting firms. Therefore, the results obtained support the exporter premium hypothesis
1999	Kraay	2,105 Chinese large and medium-sized manufacturing firms for the period 1988-1992	OLS regression	Exporting firms tend to be larger than non-exporting firms in terms of sales and employment. Besides, exporters enjoy higher productivity levels, measured as TFP and labor productivity by sales per worker, and lower unit costs, than non-exporters. The author finds evidence that supports the existence of the exporter premium
1999	Sjöholm	Indonesian domestically owned manufacturing establishments with more than 20 employees for the years 1980 and 1991	OLS regression	Indonesian manufacturing exporters show higher levels of labor productivity, measured as value added per worker, than non-exporters, regardless of the competitiveness of the local market. Besides, Indonesian manufacturing importers have higher levels of labor productivity than non-exporters. The author concludes that establishments engaged in international trade have high levels of labor productivity, supporting the exporter premium hypothesis
2000	Aw, Chung and Roberts	About 12,000 manufacturing plants in Taiwan for the years 1981, 1986 and 1991, and 22,000 plants with more than 5 workers for South Korean manufacturing plants for the years 1983, 1988 and 1993. Only	OLS regression	In all five industries (apparel, electrical machinery and electronics, plastics, textile and transportation equipment) for Taiwan and South Korea, exporters, on average, have higher productivity levels, measured as TFP, than non-exporters. Being an exporter signals higher productivity, but export intensity has little effect on

		manufacturing plants from 5 major export industries		productivity at the firm level. The data is aligned with the exporter premium hypothesis by which exporters have higher productivity levels than non-exporting firms
2001	Isgut	10,747 Colombian manufacturing plants with 10 or more employees for the period 1981-1991	OLS regression	Exporters, on average, are more capital intensive, they have more employees and they are more labor productive, measured as sales per worker and value added per worker, than non-exporters. There is evidence in favor of the exporter premium with greater effects for more export intensive firms. Regarding the wages paid to blue-collar workers and managers the more export intensive the firm, the lower the wages paid to the employees
2002	Castellani	2,117 Italian manufacturing firms with more than 10 employees that answer two waves of surveys in the year 1989 and 1992	OLS regression	Exporters outperform firms selling only in the domestic market as they have higher levels of productivity measured as TFP. The authors find clear evidence in favor of the exporter premium for the sample of firms analyzed as exporters outperform non-exporters
2002	Delgado, Fariñas and Ruano	About 1,800 Spanish manufacturing firms per year with at least 10 employees for the period 1991-1996. Includes with certainty 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	One and two-sided Kolmogorov-Smirnov tests	For the whole population of firms the productivity of exporters stochastically dominates the productivity of non-exporters measured as TFP. The stochastic dominance on the productivity level of exporters versus non-exporters for the whole population of firms supports the hypothesis of the exporter premium of exporter versus non-exporters

2002	Hallward, Iarossi and Sokoloff	Around 2,700 manufacturing establishments in 5 East Asian countries with 20 or more employees for the period 1996-1998	OLS regression	Exporters, on average, have higher levels of productivity, measured as TFP, than non-exporters. This productivity difference between exporters and non-exporters is larger in developing economies such as Indonesia, the Philippines and Thailand, and smaller in most developed economies such as Malaysia and South Korea. Nevertheless, the results support the exporter premium hypothesis in the 5 East Asian countries analyzed
2002	Wagner	Lower Saxony (Germany) manufacturing plants with at least 20 employees for the period 1978-1989	OLS regression	Exporters are more labor productive, measured as sales per worker, than non-exporters. However this difference is not statistically significant. Moreover, exporters are larger and pay higher wages than non-exporters. The data points towards the existence of an exporter premium of exporters over non-exporters but with low statistical significance levels
2003	Baldwin and Gu	Canadian manufacturing firms using survey data for large plants and tax records data for the remainder, for the years 1974, 1979, 1984, 1990, 1993 and 1996. All small firms are assumed to be non-exporters	Descriptive statistics OLS regression	Exporters are more productive than non-exporters, measured as TFP and labor productivity by value added per worker. Besides, within the universe of exporting firms continuing exporters are the most productive, followed by quitters and entering exporters. Therefore, the authors obtain results that support the hypothesis that exporters tend to be more productive firms than non-exporters, suggesting the validity of the exporter premium
2004a	Bernard and Jensen	50,000 to 60,000 US manufacturing plants for the period 1983-1992. Plants with more	OLS regression	The differences in the productivity levels, measured as TFP, between continuing exporting plants and non-exporting plants are

		than 250 employees are sampled with certainty, and others with probability <1		statistically significative in favor of exporters. Therefore exporters and more productive than non-exporters. The authors obtain results that are aligned with the exporter premium hypothesis
2004	Girma, Greenaway and Kneller	8,992 UK manufacturing companies over the period 1988-1999. The authors omit foreign firms, parent firms and 1 percent top and bottom outliers	Descriptive statistics OLS regression	On average, exporting firms are larger than non-export firms measured by sales and employment, they pay higher wages and they are more productive measured as TFP and labor productivity by value added per worker. Furthermore, the positive relationship between exporting and firm productivity increases with export intensity. The authors find evidence in favor of the existence of the exporter premium among exporters
2004	Mengistae and Pattillo	About 230 manufacturing firms per year for Ethiopia, Ghana and Kenya for the period 1992-1995 (years depend on the country) and focused on some industries such as woodwork and metalwork	Generalized least squares (GLS) estimator OLS regression	Exporters have, on average, higher productivity levels, measured as TFP, than non-exporting firms. Exporters also have higher foreign participation within their equity, they employ more foreign licenses and they have more access to foreign technical assistance. All these results support the exporter premium hypothesis
2005	Alvarez and López	7,132 Chilean manufacturing plants with at least 10 employees for the period 1990-1996	OLS regression	Exporting plants have superior performance characteristics than non-exporting plants. Exporters are more productive, measured as TFP, larger in terms of sales and value added, they pay higher wages and they are more capital intensive than non-exporting firms. The authors find positive evidence in favor of the existence of an exporter premium among exporters compared to non-exporters

2005	Arnold and Hussinger	389 German small, medium and large sized manufacturing firms for the period 1992-2000	Descriptive statistics	Exporters, on average, have higher productivity levels, measured as TFP, they employ more workers, they sale more, they invest more in R&D, they pay better wages, they are older and they innovate more in new products. The data is aligned with the exporter premium hypothesis by which exporters have better performance characteristics than non-exporters
2005	Greenaway, Gullstrand and Kneller	3,570 Swedish manufacturing and services firms for the period 1980-1997	Descriptive statistics	Exporting firms are larger in terms of output and employment and they pay higher wages than non-exporters. However, they have lower productivity measured as TFP. There is no supporting evidence in favor of the exporter premium as non-exporting firms seem to have higher productivity levels than exporting firms
2005	Girma, Kneller and Pisu	5,332 UK manufacturing firms with more than 50 employees for the period 1990-1996	One and two-sided Kolmogorov-Smirnov tests	The productivity distribution, measured as TFP, of exporters dominates the productivity distribution of non-exporters, while the productivity distribution of multinationals firms dominates both that of non-exporters and that of exporters. The data is aligned with the exporter premium hypothesis where firms that export have higher productivity levels than non-exporters and where firms that invest in factories abroad have higher productivity levels than firms that only export
2005	Hahn	Near 80,000 South Korean manufacturing plants per year with 5 or more employees for the period 1990-1998	Descriptive statistics OLS regression	The author obtains that exporters are larger in terms of employment and output, more capital intensive, pay better wages to their workers, they have more non-production workers, invest more in R&D and

				they are also more productive, measured as TFP and labor productivity by sales per worker and value added per worker, than non-exporters, even after controlling for industry, size and region. The data is aligned with the exporter premium hypothesis by which exporters have higher productivity levels than non-exporters
2006	López	3,427 Colombian manufacturing firms for the period 1992-2002	Descriptive statistics	The data shows that the group of continuous exporters have the best firm performance characteristics, followed by the group of switchers, new exporters, quitters and non-exporters. More specifically, continuous exporters are larger in terms of output, more capital intensive, pay higher wages to their workers and they have higher labor productivity levels, measured as sales per worker, than all the other groups of firms. Additionally, their average variable costs are lower compared to all other groups. The data is aligned with the exporter premium hypothesis
2006	Yasar, Nelson and Rejesus	Turkish manufacturing plants with more than 25 employees for the apparel, food and textile industries for the period 1990-1996	Quantile regression OLS regression	There is evidence that the exporter premium, when productivity is measured as TFP, is present across the entire conditional output distribution of firms. Small exporting plants at the lower tail of the distribution exhibit a positive but small exporter premia. While continuous exporters enjoy the highest exporter premia over non-exporters, followed by new exporters, exiting exporters and switchers. The authors obtain evidence aligned with the exporter premium hypothesis

2007	Fariñas and Martín	About 1,800 Spanish manufacturing firms per year with at least 10 employees for the period 1990-1999. Includes with certainty 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	Descriptive statistics OLS regression	Exporters are larger in terms of size and sales, they pay better wages, they use larger capital stocks, they invest more in R&D and they have more foreign ownership within their equity. Exporting firms are also more productive than non-exporting firms, measured either in terms of labor productivity by value added per hour worked or measured with TFP. The results obtained signal the existence of substantial productivity differences between exporters and non-exporters that support the exporter premium hypothesis
2007a	Wagner	54 NNTT empirical papers for 34 countries that use micro-data at the firm level published between 1995 and 2006	Meta-analysis	Exporters are found to be more productive than non-exporters. However given all the difficulties to compare the results from the vast numbers of studies in detail, it is too early to speak of this finding as a stylized fact. The NNTT literature presents clear evidence if favor of the exporter premium hypothesis
2008	Blanes, Dovis, Milgram and Moro	756 Spanish manufacturing firms with more than 10 employees for the period 1991-2002	Descriptive statistics	Exporters display a higher R&D and marketing intensity than non-exporters. Besides, exporters have more foreign capital participation in their equity and they show higher labor productivity, measured as value added per worker, than non-exporting firms. These results give support to the exporter premium hypothesis by which exporting firms have higher productivity levels than non-exporting firms
2008	ISGEP	Firm level data for companies with at least 20 employees for 14 different countries of	OLS regression	The main result of the analysis is that exporters are more productive than non-exporting firms, measured as labor productivity by sales per worker. However, the exporter premium varies a lot across

		the European Union (EU), Latin America and China		countries. The productivity premium is larger in countries with lower export participation rates, more restrictive trade policies, lower per capita GDP, less effective governments, worse regulatory quality and in countries exporting to relatively more distant markets. The data supports the existence of the exporter premium among exporting firms
2008	Serti and Tomasi	38,771 Italian manufacturing firms with 20 or more employees for the period 1989-1997, with near 20,000 firms sampled per year	OLS regression	Firms that sell in the export market have superior performance characteristics with respect to the group of firms that operate only in the domestic market. Exporters are, on average, more productive, measured as TFP and labor productivity by value added per worker, they are bigger in terms of sales and employment, more endowed with capital, more capital intensive, more skilled-labor intensive and they have lower unit labor costs than non-exporters. The results validate the hypothesis of the exporter premium. Being an exporter implies better performance characteristics compared to non-exporters
2009	Granér and Isaksson	161 Kenyan manufacturing firms in four main cities with more than 5 employees, for the period 1992-1994	Descriptive statistics	The data shows that exporters are more technical efficient, pay higher wages, are larger in terms of sales, have more foreign ownership, and have higher capital intensity than non-exporters. However the exporter premium varies according to the country of destination of the exports. The data obtained is aligned with the exporter premium hypothesis

2010	Ito and Lechevalier	Approximately 12,000 Japanese manufacturing firms with 50 or more employees for the period 1994-2003	Descriptive statistics OLS regression	Exporters are older, larger in terms of sales and employment, they pay higher wages, they are more capital intensive, more innovative and they are more productive, measured as TFP and labor productivity by value added per worker, than non-exporting firms. There is evidence in favor of the exporter premium with an increasing premia if the exporter also performs R&D activities. It seems that export and innovation strategies are complementary
2010	Kox and Rojas	Dutch manufacturing and services plants with 50 or more employees sampled with certainty and firms with less than 50 employees sampled on a rotatory basis for the period 1999-2005 Dutch manufacturing and services firms with equity higher than Eur 23 million for the period 1997-2005	Descriptive statistics OLS regression OLS regression with fixed effects	There is a strictly monotonic performance hierarchy between the different internationalization levels. Dutch affiliated multinational firms are substantially more labor productive, measured as sales per worker and value added per worker, than establishments that only export, and both groups are more productive than domestic non-exporters. There is evidence in favor of the exporter premium
2010	Yang and Mallick	2,340 Chinese firms with 15 or more employees for the period 2000-2002 from 18 major Chinese cities	Descriptive statistics Propensity score matching (PSM)	Exporters tend to be more capital intensive, larger in terms of sales and employment, younger and they are more productive measured as TFP and labor productivity by sales per worker, than non-exporters. The authors find positive evidence in favor or the exporter premium hypothesis

2011	Ranjan and Raychaudhuri	Large Indian manufacturing firms for the period 1990-2006. The mean size of the firms sampled exceeds 3,000 employees (large firms sampled)	OLS regression	Exporters have better performance characteristics than non-exporters. Exporters are larger in terms of employment, they are more capital intensive, they pay higher wages, and they have higher productivity levels, measured as TFP and labor productivity by sales per worker and value added per worker, than non-exporters. Firms that always export show better performance characteristics than firms that are exporters for some periods, and both groups have superior characteristics than always non-exporters. The data is aligned with the existence of the exporter premium hypothesis
2011	Verardi and Wagner	About 34,000 manufacturing firms with at least 20 employees in West Germany for the period 1995-2006	OLS regression with fixed effects OLS robust regression with fixed effects	Dropping outliers from the analysis leads to changes in the results. The exporter premium, after dropping outliers, is positive but becomes smaller compared to the analysis that includes outliers. Moreover, the labor productivity difference, measured a sales per worker, between firms that export outside the Eurozone compared to firms that export inside the Eurozone is positive, but becomes non-significant after dropping outliers from the analysis. There is no evidence in favor of the exporter premium hypothesis when outliers are not taken into account
2011	Vogel	German services sector firms with at least one insured employee and firm turnover higher than Eur 17,081, for the period 2001-2005	Descriptive statistics OLS regression	The author finds that in both parts of Germany (East and West), exporters in the services sector are larger in terms of sales and employment, and have higher labor productivity levels, measured as sales per worker, than non-exporters. The evidence obtained supports the exporter premium hypothesis

			OLS regression with fixed effects	
2012	Barboni, Ferrari, Melgarejo and Peluffo	1,330 Uruguayan manufacturing plants with more than 5 workers for the period 1997-2006 (in 2006 only firms with more than 50 employees)	Descriptive statistics OLS regression OLS regression with fixed effects	The authors observe that exporting firms are bigger in terms of employment, sales, value added, and foreign ownership of capital, than domestic firms. Besides, exporting firms exhibit higher productivity levels, measured as TFP and labor productivity by value added per worker, than non-exporting firms. This exporter premium is higher for exporters that have as a main destination for their exports developed countries. Therefore, the evidence points towards the existence of the exporter premium
2012	Haidar	33,510 domestically owned Indian manufacturing firms for the period 1991-2004	OLS regression	Exporters have, on average, larger sales volumes, higher income, and more capital than purely domestic firms. Exporters also pay higher wages, they are older, and they have higher productivity, measured as TFP, than non-exporters. There is evidence in favor of the exporter premium as exporters perform better than non-exporters
2012	Wagner	25 NNTT empirical papers for 11 countries which use micro-data at the firm level published between 2006 and 2011	Meta-analysis	On some topics, such as the exporter premium hypothesis, there are enough number of empirical studies using data from different countries which report results that point in the same direction, for which the big picture that exporters are more productive than non-exporters becomes a stylized fact. There is ample evidence in the NNTT literature supporting the exporter premium hypothesis to become a stylized fact

2013	Boermans	More than 1,000 small and medium enterprises (SME) manufacturing firms from Ghana, Kenya, Nigeria, South Africa and Tanzania for the period 1991-2003	Descriptive statistics OLS regression	Exporting firms are bigger, older, more capital intensive, pay higher wages and employ relatively more skilled workers in terms of education (number of years of schooling), age and tenure (years of work experience) than non-exporters. Moreover, firms that export to destinations outside Africa tend to be bigger, more capital intensive and pay higher wages than exporters that only trade within Africa. Evidence in favor of the exporter premium, but not tested with productivity indicators
2013	Temouri, Vogel and Wagner	Data for British, French and German firms operating in the business services sector with more than Eur 250,000 in turnover per year	Descriptive statistics OLS regression with fixed effects	Exporting services firms pay on average higher wages than firms that serve only the domestic market in France, Germany and UK. In France and Germany exporters are also more labor productive, measured as sales per worker or value added per worker, and larger than non-exporters. In France and UK exporters are more profitable than non-exporters, however for German firms it is the opposite. The authors find evidence aligned with the exporter premium hypothesis
2014	Bravo, Benavente and González	Chilean manufacturing firms with 10 or more workers for the period 1997-2004	OLS regression	Exporters are larger, invest more in R&D, they are more capital intensive, they are more productive measured as TFP and labor productivity by value added per worker, they have a larger share of skilled workers and they pay higher wages than non-exporters. The authors find positive evidence in favor of the exporter premium hypothesis as exporters have better performance characteristics than non-exporters, specifically higher levels of productivity

2014	Minondo	Approximately 17,000 Spanish services sector firms per year with 10 or more employees for the period 2001-2007	OLS robust regression	Exporters in the services sector are more productive than non-exporters, measured as labor productivity. The productivity premium for exporters in non-Internet services, excluding accommodations and restaurants, is lower than the productivity premium for exporters in Internet related services. The data for Spanish services sector firms is aligned with the exporter premium hypothesis
2015	Casas, Díez and González	Over 4,000 Colombian non-commodities manufacturing firms for the period 2005-2013. The average firm employs 160 workers (large firms sampled)	Descriptive statistics OLS regression	The analyzed exporters, on average, pay higher wages, are more capital intensive, and have higher levels of productivity, measured as TFP and labor productivity by sales per worker and value added per worker, than non-exporting firms. There are significant productivity differences among the different types of exporters, with the highest exporter premium for continuous exporters, for exporters that export to more countries, and for exporters that export more products. These results are aligned with the exporter premium hypothesis
2015	Máñez, Rochina and Sanchis	2,182 Spanish manufacturing firms with at least 10 employees for the period 1990-2009. Includes with certainty 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	OLS regression	The authors find that firms that export, perform R&D, or undertake both activities simultaneously are larger, more capital intensive and have higher labor productivity levels, measured as sales per worker, than firms that neither undertake R&D nor export. The authors find evidence in favor of the exporter premium hypothesis

2016	Zhang	1,578 private owned manufacturing firms from 25 Chinese cities for the year 2011	OLS regression	Exporters are larger, they employ more capital, they are more innovative, they have more foreign ownership and they employ more educated workers. Direct exporters have higher levels of productivity, measured as total output, than indirect exporters and both types of exporters have higher productivity levels than non-exporters. The data is aligned with the exporter premium hypothesis
2017	Cruz, Newman, Rand and Tarp	5 surveys for 275 Mozambican manufacturing firms for the period 1999-2006. The average size of firms in the sample is larger than the average size of firms in the population (large firms sampled)	Descriptive statistics OLS regression Blinder-Oaxaca propensity score	Exporters, on average, are larger in terms of size and employment, they are older, more capital intensive and more labor productive, measured as sales per worker, than non-exporting firms. Moreover, the exporter productivity premium tends to increase with low export participation rates and low institutional quality at a country level. The results obtained by the authors support the exporter premium hypothesis
2017	Njikam	Database for African manufacturing firms for 19 Sub-Saharan countries for the year 2009	Descriptive statistics OLS regression with fixed effects	Exporters are larger in terms of output and employment, they are more capital intensive, they pay higher wages, they have higher foreign capital and they are more productive measured as TFP and labor productivity by value added per employee. There is a link between export destination and firm performance where the export destination matters when quantifying the exporter premium. The results obtained are aligned with the exporter premium

2017	Rehman	More than 15,000 manufacturing and services sector formal firms from 29 Eurasia and Central and Eastern Europe countries with 5 or more employees, for the year 2011	Two-sided Kolmogorov-Smirnov test	The productivity level, measured as TFP, of exporters and innovators has stochastic dominance over the productivity level of non-exporters and non-innovators. Where innovation can be measured as process innovation, product innovation, R&D investment, organizational innovation and marketing innovation. There is evidence in favor of the exporter premium, since exporters tend to be more productive than non-exporting firms
2018	Duch and Martens	6,933 firms from 26 member states of the EU in the year 2015	OLS robust regression Quantile regression	Online exporters are, on average, more labor productive than non-exporters either if the firm sells goods or if the firm sells services. There is evidence in favor of the exporter premium. However, young exporters, which are three-year old or less, do not show productivity differences compared to non-exporting firms
2018	Matthee, Rankin, Webb and Bezuidenhout	South African manufacturing firms for the period 2010-2013. It only includes exporters which export more than Zar 10,000/year	Descriptive statistics OLS regression OLS regression with fixed effects	Exporters are larger in terms of output and employment, they are more productive, measured as TFP and labor productivity by sales per worker, they pay higher wages, and they are more capital intensive, than non-exporters. Furthermore, multiple-destination exporters are larger, more labor productive, have higher TFP, pay higher wages, and they are more capital intensive than single-destination exporters. And, single-destination exporters, in turn, exhibit superior performance characteristics compared to non-exporters. Additionally, multiproduct exporters are larger in terms of output, they have higher labor productivity and TFP, they pay higher wages, and they use more intermediate inputs per worker than

				single-product exporters. Finally, single-product exporters have similar TFP levels than domestic firms. These findings support the exporter premium hypothesis
2018	Yun	Vietnamese manufacturing micro, small and medium enterprises (MSME), with no more than 200 workers, for the years 2011, 2013 and 2015	OLS robust regression	Exporters, including those that are incorporated to a global supply chain, show higher levels of labor productivity, measured as value added per worker, than non-exporters, and they are larger in terms of sales and employment. However, there are no clear differences between exporters and non-exporting firms regarding the wages they pay to their employees, their capital intensity and the skilled-labor force. The results point towards the existence of the exporter premium
2019	Garcia and Voigtländer	About 5,000 Chilean manufacturing plants per year with 10 or more workers for the period 1996-2007, Colombian plants for the period 2001-2013, and Mexican plants for 1994-2003	OLS regression	Exporters are larger in terms of employment and sales, pay higher wages to their workers, have higher markups, and present higher levels of productivity, measured as TFP, than non-exporting firms. The data analyzed is aligned with the exporter premium hypothesis

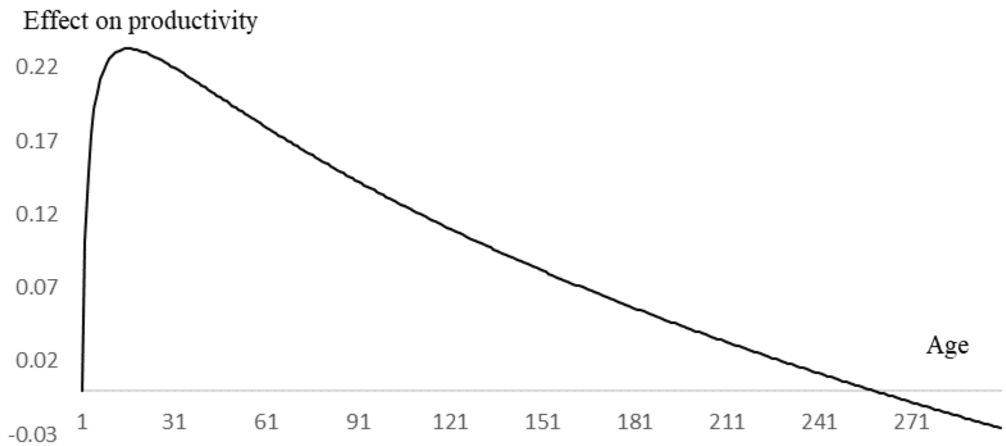
Table a2. Descriptive statistics for all the variables included in the research model for the exporter premium by export status group, unbalanced panel data for the period 1990-2015 (constant values in euros)

Export status					
Micro-exporters <= €25,000/year					
Variable $_t$	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_t$	17,477.15	669,241.30	85,789.63	72,641.96	61,143.44
VA/worker $_t$	44.15	390,840.70	33,131.17	28,808.33	24,659.70
Wage/worker $_t$	7,579.58	66,385.68	23,609.04	22,243.08	8,305.79
Age $_t$	2.00	121.00	21.32	19.00	15.10
Capital/worker $_t$	425.82	697,778.7	43,758.40	30,109.86	50,076.51
Foreign $_t$	0.00	49.00	0.19	0.00	2.66
R&D/sales $_t$	0.00	21.95	0.27	0.00	1.46
Sales/hour $_t$	8.74	373.53	48.82	41.41	34.49
VA/hour $_t$	0.02	212.84	18.87	16.59	13.92
Marketing/sales $_t$	0.00	26.10	1.03	0.30	2.04
Micro-exporters <= €50,000/year					
Variable $_t$	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_t$	8,996.55	2,957,886.00	98,044.68	75,850.92	145,444.70
VA/worker $_t$	44.15	390,840.70	34,331.44	29,889.13	24,881.74
Wage/worker $_t$	7,579.58	66,385.68	24,307.15	22,723.73	8,907.73
Age $_t$	2.00	121.00	22.48	20.00	14.37
Capital/worker $_t$	373.16	943,569.40	46,046.96	27,671.63	71,390.58
Foreign $_t$	0.00	100.00	0.59	0.00	6.04
R&D/sales $_t$	0.00	21.95	0.24	0.00	1.36
Sales/hour $_t$	4.84	1,690.22	56.31	44.02	84.69
VA/hour $_t$	0.02	212.84	19.57	17.00	14.17
Marketing/sales $_t$	0.00	26.10	0.95	0.20	1.99
Non-exporters					
Variable $_t$	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_t$	135.36	3,252,992.00	108,101.20	74,494.53	131,227.30
VA/worker $_t$	14.30	952,511.50	36,370.46	29,858.26	28,995.47
Wage/worker $_t$	2,022.30	166,941.30	25,274.77	23,162.05	11,368.61
Age $_t$	1.00	155.00	22.44	18.00	19.12
Capital/worker $_t$	36.98	6,527,156.00	56,095.94	25,348.41	131,401.70
Foreign $_t$	0.00	100.00	2.85	0.00	15.36
R&D/sales $_t$	0.00	3,266.40	0.54	0.00	26.53
Sales/hour $_t$	0.08	2,168.66	61.39	42.27	74.79
VA/hour $_t$	0.01	536.11	20.62	16.91	16.92
Marketing/sales $_t$	0.00	493.00	0.75	0.10	4.43

All exporters					
Variable $_t$	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_t$	3,989.47	8,799,910.00	214,176.50	151,695.80	269,678.50
VA/worker $_t$	4.48	3,417,196.00	57,167.29	46,663.35	54,208.10
Wage/worker $_t$	1,281.87	251,338.60	35,361.92	33,563.98	14,492.35
Age $_t$	1.00	271.00	35.10	30.00	25.01
Capital/worker $_t$	0.39	2,535,407.00	107,547.90	66,992.34	139,258.80
Foreign $_t$	0.00	100.00	24.82	0.00	41.58
R&D/sales $_t$	0.00	278.54	1.04	0.01	3.19
Sales/hour $_t$	3.78	5,054.52	123.14	86.93	156.36
VA/hour $_t$	0.00	1,999.84	32.70	26.57	31.45
Marketing/sales $_t$	0.00	96.50	1.54	0.30	3.32
Large exporters > €25,000/year					
Variable $_t$	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_t$	3,989.47	8,799,910.00	216,499.20	153,521.30	271,424.30
VA/worker $_t$	4.48	3,417,196.00	57,598.00	47,033.38	54,495.52
Wage/worker $_t$	1,281.87	251,338.60	35,574.57	33,792.41	14,492.69
Age $_t$	1.00	271.00	35.34	30.00	25.08
Capital/worker $_t$	0.39	2,535,407.00	108,661.60	67,894.56	140,055.80
Foreign $_t$	0.00	100.00	25.26	0.00	41.82
R&D/sales $_t$	0.00	278.54	1.06	0.02	3.21
Sales/hour $_t$	3.78	5,054.52	124.45	87.94	157.35
VA/hour $_t$	0.00	1,999.84	32.94	26.78	31.61
Marketing/sales $_t$	0.00	96.50	1.55	0.30	3.34
Large exporters > €50,000/year					
Variable $_t$	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_t$	3,989.47	8,799,910.00	218,287.10	155,421.10	272,136.90
VA/worker $_t$	4.48	3,417,196.00	57,973.98	47,316.13	54,785.08
Wage/worker $_t$	1,281.87	251,338.60	35,753.27	33,980.56	14,497.51
Age $_t$	1.00	271.00	35.54	30.00	25.19
Capital/worker $_t$	0.39	2,535,407.00	109,657.60	68,801.07	140,532.70
Foreign $_t$	0.00	100.00	25.68	0.00	42.04
R&D/sales $_t$	0.00	278.54	1.07	0.04	3.23
Sales/hour $_t$	3.78	5,054.52	125.45	88.92	157.76
VA/hour $_t$	0.00	1,999.84	33.15	26.95	31.79
Marketing/sales $_t$	0.00	96.50	1.56	0.30	3.36

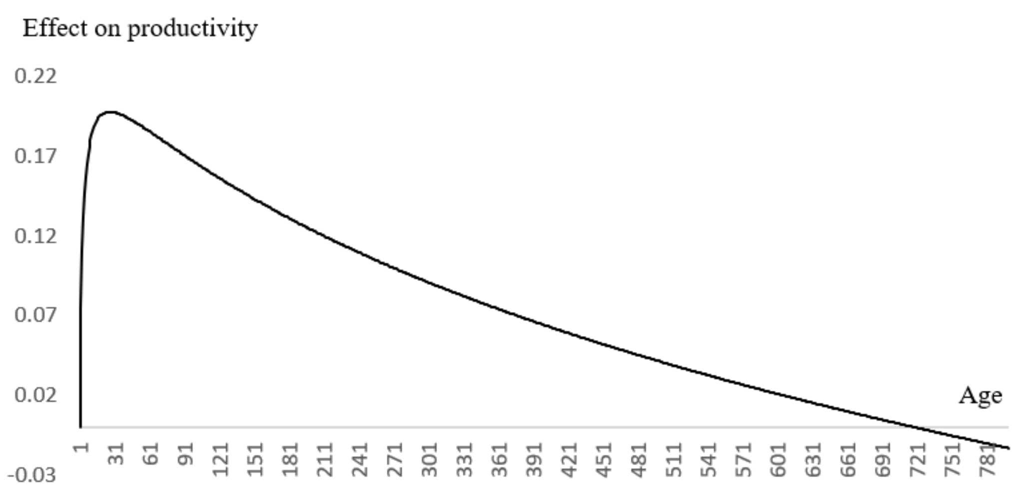
Source: Own elaboration with unbalanced panel data from the ESEE for the period 1900-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Figure a1. Graphical representation of the effect of firm's age on productivity when the dependent variable is sales per worker for the exporter premium



Source: Own elaboration with unbalanced panel data from the ESEE for the period 1900-2015. Effect on labor productivity measured as sales per worker for the group of all exporters. Age is measured in years since the company creation. Year of creation has a value of 1. There are no major variations for other groups of exporters.

Figure a2. Graphical representation of the effect of firm's age on productivity when the dependent variable is value added per worker for the exporter premium



Source: Own elaboration with unbalanced panel data from the ESEE for the period 1900-2015. Effect on labor productivity measured as value added per worker for the group of all exporters. Age is measured in years since the company creation. Year of creation has a value of 1. There are no major variations for other groups of exporters.

Table a3. Correlation matrix for all the variables included in the research model for the exporter premium when the dependent variable is sales per worker

Status: all exporters vs non-exporters								
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Productivity $_t$ (log)	1.000							
2. Status $_t$	0.408	1.000						
3. Wage $_t$ (log)	0.652	0.367	1.000					
4. Age $_t$ (log)	0.271	0.285	0.403	1.000				
5. Age $_t$ (log) ^{2}	0.279	0.287	0.410	0.982	1.000			
6. Capital $_t$ (log)	0.592	0.334	0.581	0.378	0.369	1.000		
7. Foreign $_t$	0.336	0.300	0.396	0.171	0.184	0.270	1.000	
8. Innovate $_t$	0.240	0.270	0.270	0.213	0.225	0.215	0.221	1.000

Source: Own elaboration with unbalanced panel data from the ESEE for period 1990-2015. Status includes the group all exporters vs non-exporters, as it subsumes all other groups of exporters. When correlations are calculated with micro-exporters and large exporters there are no additional correlations among variables higher than 0.500 and the results remain highly consistent.

Table a4. Correlation matrix for all the variables included in the research model for the exporter premium when the dependent variable is value added per worker

Status: all exporters vs non-exporters								
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Productivity $_t$ (log)	1.000							
2. Status $_t$	0.310	1.000						
3. Wage $_t$ (log)	0.681	0.367	1.000					
4. Age $_t$ (log)	0.271	0.284	0.404	1.000				
5. Age $_t$ (log) ^{2}	0.276	0.286	0.411	0.982	1.000			
6. Capital $_t$ (log)	0.506	0.334	0.583	0.378	0.370	1.000		
7. Foreign $_t$	0.303	0.300	0.396	0.171	0.185	0.271	1.000	
8. Innovate $_t$	0.226	0.270	0.270	0.213	0.226	0.215	0.221	1.000

Source: Own elaboration with unbalanced panel data from the ESEE for period 1990-2015. Status includes the group all exporters vs non-exporters, as it subsumes all other groups of exporters. When correlations are calculated with micro-exporters and large exporters there are no additional correlations among variables higher than 0.500 and the results remain highly consistent.

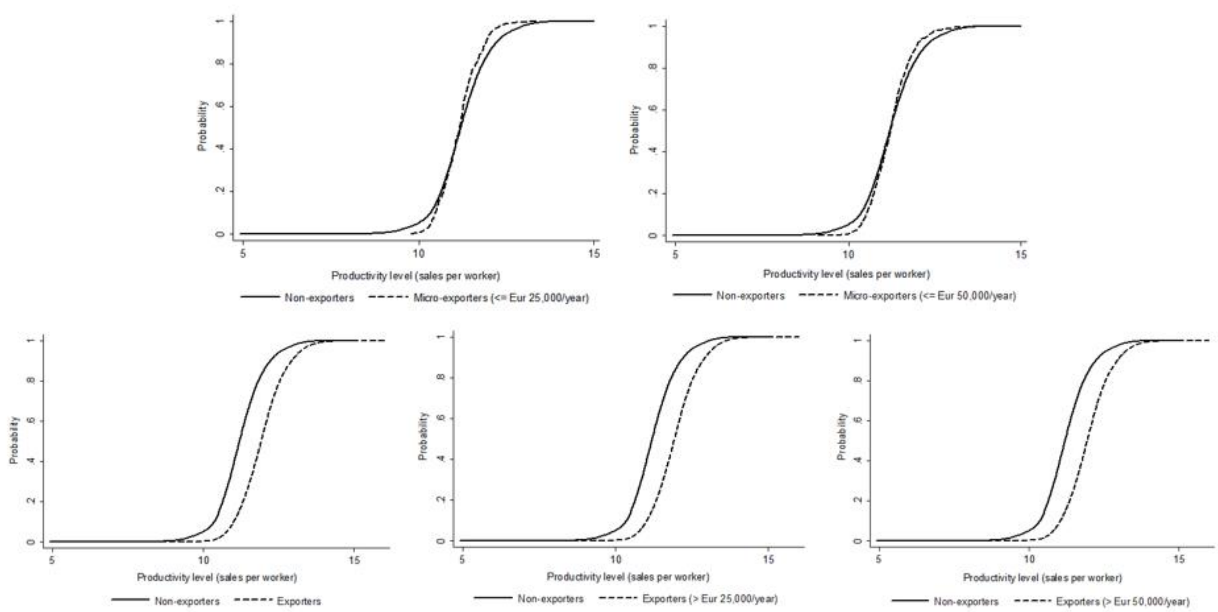
Addendum a1

If there is a productivity difference between exporters and non-exporters, as predicted by the exporter premium, which reflects a self-selection process or a learning process at work with the exporting activity, the labor productivity distribution of exporters must dominate the labor productivity distribution of non-exporters, based on the concept of first order stochastic dominance to establish a ranking for both groups (Máñez et al., 2009).

Being F and G the cumulative labor productivity distribution functions for both groups of firms, first order stochastic dominance of F relative to G is defined by the following condition: $F(z) - G(z) \leq 0$ being $Z_1,...,Z_n$ a random sample of size *n*, which corresponds to a group of firms from the distribution function F (exporters), and $Z_{n+1},...,Z_{n+m}$ a random sample of size *m*, independent of the first one, which corresponds to a different group of firms from the distribution function G (non-exporters), where Z_i represents the labor productivity level of firm *i* (Delgado et al., 2002).

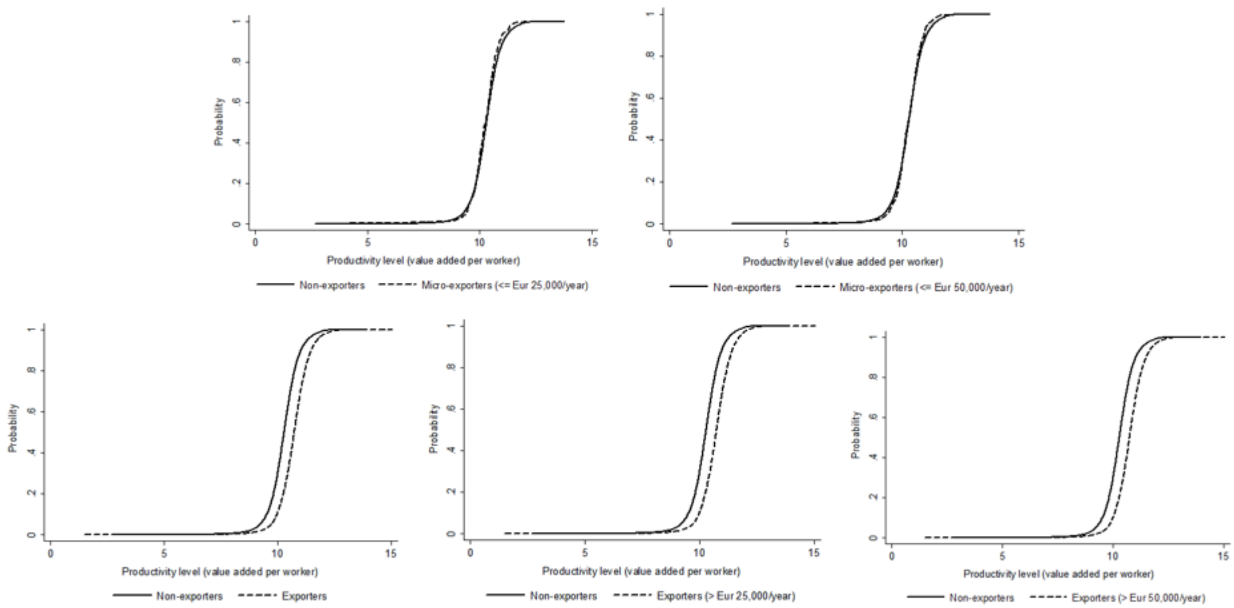
To illustrate the comparisons between different groups of exporters (micro-exporters, all exporters and large exporters) to non-exporters, figure a3 and figure a4 report estimators of the labor productivity distribution functions, measured as sales per worker and value added per worker, for a visual comparisons between different groups of exporters compared to non-exporters. The five groups of exporters compared are: i) micro-exporters which do not export more than Eur 25,000/year, ii) micro-exporters which do not export more than Eur 50,000/year, iii) all exporters, iv) large exporters which export more than Eur 25,000/year, and v) large exporters which export more than Eur 50,000/year. From figure a3 and figure a4 it can be inferred that the labor productivity distribution of large exporters and all exporters stochastically dominates the productivity distribution of non-exporting firms, while the labor productivity distribution of micro-exporters does not stochastically dominate the productivity distribution of non-exporters. These results support the hypothesis that micro-exporters are no more productive than non-exporters, as well as they sustain that there is no exporter premium for micro-exporters as predicted by the conceptual framework, while validates previous findings of the NNTT literature where the group of all exporters is more productive than the group of non-exporters, suggesting the existence of the exporter premium for all exporters and large exporters.

Figure a3. Labor productivity differences for different groups of exporters versus non-exporters (cumulative distribution function), sales per worker as productivity level for the exporter premium



Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Figure a4. Labor productivity differences for different groups of exporters versus non-exporters (cumulative distribution function), value added per worker as productivity level for the exporter premium



Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Table a5. OLS robust regression with fixed effects for the exporter premium, dependent variable sales per worker and marketing intensity as control variable

Variable	Export status				
	Micro-exporters <= €25,000	**Micro-exporters <= €50,000**	**All exporters**	**Large exporters >€25,000**	**Large exporters >€50,000**
Robust values					
Status $_t$	.018	.041**	.067***	.074***	.074***
	(0.88)	(2.46)	(4.72)	(4.65)	(4.32)
Wage $_t$	.550***	.553***	.545***	.545***	.544***
	(17.86)	(18.29)	(24.72)	(24.54)	(24.26)
Age $_t$	.271***	.268**	.381***	.387***	.390***
	(3.21)	(3.22)	(6.41)	(6.43)	(6.46)
Age $_t^2$	-.110***	-.109***	-.159***	-.160***	-.161***
	(-3.72)	(-3.76)	(-8.08)	(-8.07)	(-8.07)
Capital $_t$	.067***	.068***	.053***	.053***	.052***
	(6.76)	(6.90)	(7.43)	(7.42)	(7.28)
Foreign $_t$	.039	.036	.032*	.032*	.032*
	(0.77)	(0.71)	(1.83)	(1.81)	(1.82)
Marketing $_t$	.091**	.086**	.066***	.066***	.066***
	(2.33)	(2.23)	(5.50)	(5.47)	(5.49)
Constant	5.202***	5.151***	5.678***	5.642***	5.663***
	(13.60)	(13.83)	(18.62)	(18.53)	(18.51)
Year and industry effect	Included	Included	Included	Included	Included
N	2,464	2,491	4,660	4,637	4,610
Observations	16,547	16,991	43,807	43,331	42,887
Adj. R squared	0.8859	0.8861	0.9004	0.9003	0.9001

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a6. OLS robust regression with fixed effects for the exporter premium, dependent variable value added per worker and marketing intensity as control variable

Variable	Export status				
	Micro-exporters <= €25,000	Micro-exporters <= €50,000	All exporters	Large exporters >€25,000	Large exporters >€50,000
Robust values					
Status $_t$	.010	.035	.028**	.031**	.027*
	(0.29)	(1.43)	(2.12)	(2.19)	(1.75)
Wage $_t$	.749***	.752***	.635***	.632***	.630***
	(20.42)	(20.86)	(23.74)	(23.53)	(23.25)
Age $_t$	.237**	.233**	.278***	.285***	.285***
	(2.18)	(2.17)	(3.84)	(3.88)	(3.85)
Age $_t^2$	-.075**	-.072*	-.097***	-.099***	-.099***
	(-1.99)	(-1.95)	(-4.33)	(-4.35)	(-4.34)
Capital $_t$	.033***	.033***	.037***	.036***	.036***
	(2.83)	(2.81)	(4.32)	(4.24)	(4.23)
Foreign $_t$	-.020	-.022	.032	.032	.032
	(-0.42)	(-0.47)	(1.59)	(1.58)	(1.58)
Marketing $_t$	.045	.043	.017	.016	.017
	(1.11)	(1.08)	(1.25)	(1.19)	(1.21)
Constant	2.140***	2.144***	3.575***	3.605***	3.630***
	(4.48)	(4.79)	(11.21)	(11.27)	(11.27)
Year and industry effect	Included	Included	Included	Included	Included
N	2,452	2,479	4,650	4,627	4,600
Observations	16,318	16,762	43,317	42,850	42,406
Adj. R squared	0.6372	0.6374	0.6556	0.6571	0.6567

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a7. OLS robust regression with fixed effects for the exporter premium, dependent variable sales per hour worked

Variable	Export status				
	Micro-exporters <= €25,000	**Micro-exporters <= €50,000**	**All exporters**	**Large exporters >€25,000**	**Large exporters >€50,000**
Robust values					
Status $_t$	.017	.045***	.069***	.076***	.076***
	(0.86)	(2.68)	(4.89)	(4.82)	(4.45)
Wage $_t$	.529***	.532***	.519***	.519***	.518***
	(17.09)	(17.50)	(23.52)	(23.34)	(23.09)
Age $_t$	.270***	.268***	.378***	.384***	.388***
	(3.24)	(3.25)	(6.40)	(6.42)	(6.45)
Age $_t^2$	-.109***	-.108***	-.156***	-.158***	-.159***
	(-3.71)	(-3.77)	(-7.99)	(-7.98)	(-7.99)
Capital $_t$	.068***	.068***	.055***	.055***	.054***
	(6.86)	(7.00)	(7.57)	(7.55)	(7.41)
Foreign $_t$	.045	.043	.032*	.032*	.032*
	(0.90)	(0.84)	(1.81)	(1.80)	(1.81)
Innovation $_t$	.056*	.058*	.023**	.023**	.022**
	(1.72)	(1.82)	(2.44)	(2.37)	(2.34)
Constant	-2.255***	-2.276***	-1.559***	-1.594***	-1.573***
	(-4.79)	(-4.86)	(-5.06)	(-5.18)	(-5.09)
Year and industry effect	Included	Included	Included	Included	Included
N	2,456	2,483	4,651	4,628	4,601
Observations	16,481	16,923	43,526	43,052	42,610
Adj. R squared	0.8857	0.8856	0.9018	0.9017	0.9016

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a8. OLS robust regression with fixed effects for the exporter premium, dependent variable value added per hour worked

Variable	Export status				
	Micro-exporters <= €25,000	**Micro-exporters <= €50,000**	**All exporters**	**Large exporters >€25,000**	**Large exporters >€50,000**
	Robust values				
Status $_t$	.010	.038	.029**	.032**	.026*
	(0.29)	(1.58)	(2.12)	(2.18)	(1.70)
Wage $_t$	.723***	.725***	.608***	.606***	.604***
	(19.32)	(19.74)	(22.75)	(22.57)	(22.29)
Age $_t$	.235**	.232**	.274***	.281***	.281***
	(2.13)	(2.13)	(3.77)	(3.81)	(3.79)
Age $_t^2$	-.072*	-.069*	-.094***	-.096***	-.096***
	(-1.89)	(-1.86)	(-4.20)	(-4.23)	(-4.22)
Capital $_t$	.034***	.033***	.038***	.037***	.038***
	(2.81)	(2.79)	(4.39)	(4.32)	(4.31)
Foreign $_t$	-.016	-.018	.028	.028	.028
	(-0.34)	(-0.38)	(1.39)	(1.38)	(1.38)
Innovation $_t$	-.005	-.004	.007	.007	.007
	(-0.16)	(-0.13)	(0.62)	(0.59)	(0.61)
Constant	-4.605***	-4.633***	-3.661***	-3.633***	-3.608***
	(-9.48)	(-9.65)	(-11.47)	(-11.34)	(-11.19)
Year and industry effect	Included	Included	Included	Included	Included
N	2,445	2,472	4,644	4,621	4,594
Observations	16,256	16,698	43,045	42,580	42,138
Adj. R squared	0.6352	0.6353	0.6562	0.6578	0.6575

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a9. OLS robust regression with fixed effects for the exporter premium, dependent variable sales per worker and foreign ownership threshold at 25 percent

Variable	Export status				
	Micro-exporters <= €25,000	**Micro-exporters <= €50,000**	**All exporters**	**Large exporters >€25,000**	**Large exporters >€50,000**
Robust values					
Status $_t$	.018	.042**	.068***	.075***	.076***
	(0.91)	(2.47)	(4.83)	(4.75)	(4.43)
Wage $_t$	.552***	.555***	.548***	.548***	.547***
	(17.79)	(18.23)	(24.78)	(24.60)	(24.33)
Age $_t$	.273***	.270***	.375***	.381***	.384***
	(3.23)	(3.24)	(6.32)	(6.34)	(6.37)
Age $_t^2$	-.110***	-.109***	-.157***	-.158***	-.159***
	(-3.75)	(-3.79)	(-7.99)	(-7.98)	(-7.98)
Capital $_t$	.067***	.067***	.053***	.053***	.052***
	(6.73)	(6.88)	(7.39)	(7.38)	(7.24)
Foreign $_t$ (25%)	.016	.012	.039**	.038**	.039**
	(0.31)	(0.24)	(2.09)	(2.08)	(2.09)
Innovation $_t$	.056*	.058*	.027***	.026***	.026***
	(1.69)	(1.78)	(2.78)	(2.72)	(2.68)
Constant	5.199***	5.150***	5.648***	5.612***	5.632***
	(13.58)	(13.81)	(18.54)	(18.45)	(18.43)
Year and industry effect	Included	Included	Included	Included	Included
N	2,464	2,491	4,660	4,637	4,610
Observations	16,547	16,991	43,807	43,331	42,887
Adj. R squared	0.8858	0.8861	0.9002	0.9001	0.8999

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a10. OLS robust regression with fixed effects for the exporter premium, dependent variable value added per worker and foreign ownership threshold at 25 percent

Variable	Export status				
	Micro-exporters <= €25,000	Micro-exporters <= €50,000	All exporters	Large exporters >€25,000	Large exporters >€50,000
Robust values					
Status $_t$	.010	.035	.028**	.032**	.027*
	(0.30)	(1.43)	(2.14)	(2.21)	(1.78)
Wage $_t$	.750***	.752***	.636***	.633***	.631***
	(20.42)	(20.87)	(23.78)	(23.58)	(23.29)
Age $_t$	.237**	.233**	.276***	.283***	.283***
	(2.17)	(2.17)	(3.81)	(3.85)	(3.82)
Age $_t^2$	-.075**	-.072*	-.096***	-.098***	-.098***
	(-1.99)	(-1.95)	(-4.29)	(-4.32)	(-4.31)
Capital $_t$	.033***	.032***	.037***	.036***	.036***
	(2.83)	(2.80)	(4.31)	(4.24)	(4.23)
Foreign $_t$ (25%)	-.032	-.034	.027	.026	.026
	(-0.65)	(-0.70)	(1.24)	(1.24)	(1.24)
Innovation $_t$	-.006	-.005	.011	.010	.010
	(-0.18)	(-0.16)	(0.87)	(0.84)	(0.85)
Constant	2.136***	2.141***	3.565***	3.595***	3.620***
	(4.47)	(4.78)	(11.21)	(11.27)	(11.27)
Year and industry effect	Included	Included	Included	Included	Included
N	2,452	2,479	4,650	4,627	4,600
Observations	16,318	16,762	43,317	42,850	42,406
Adj. R squared	0.6371	0.6373	0.6556	0.6571	0.6567

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

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CHAPTER II. THE SELF-SELECTION EFFECT

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1. Introduction

The self-selection (SS) effect refers to the mechanism by which the export market selects the most productive companies among domestic firms to become exporters, caused by the fact that entering the export market entails high export entry costs which only the most productive firms can absorb. Whereas, less productive domestic firms do not find it profitable to incur in high export entry costs and remain non-exporters (Melitz, 2003).

The relevant international trade literature has found that exporting firms are a minority and they are, on average, larger and more productive (Bernard and Jensen, 1995). Therefore, the study of the SS effect is very relevant, due to the fact exporters can be more productive for three reasons: i) they are already more productive before starting to export to cover the high export entry cost, ii) they become more productive thanks to the export activity through learning effects, and iii) they are more productive before starting to export and also they become more productive through exports. If we accept the premise that a higher productivity at a country level increases national welfare and that a higher national welfare is desirable, the existence or not of the SS effect has paramount implications nationwide.

If there is no SS effect and firms improve their productivity through learning effects induced by the export activity, all efforts should be oriented to facilitate for the maximum number of domestic companies commencing the export process in order to benefit from the export-related productivity boost. As a result, the national aggregate productivity and welfare levels will rise.

Nevertheless, if only the most productive firms access the international market and there is a SS effect at work, the efforts must shift from facilitating the entry into the export market to support processes which enhance the productivity of domestic firms. The export facilitating initiatives, for instance, include activities such as matching local firms with foreign customers or reducing the market intelligence cost required to study the foreign market before entering a new market. Whereas, the productivity enhancing programs comprise activities such as providing accessible funds for technology investment and product and process innovations, or facilitating the continuous training of human resources[5]. These different types of support to firms have different goals (to access the export market vs improve productivity) and ultimately, they have a different impact at a firm level and at a national level, depending on the existence or not of the SS effect and the learning by exporting (LBE) effect.

The current international trade literature seems to have reached a consensus on the existence of the SS effect (Wagner, 2007; Wagner, 2012). Nevertheless, as firm-level databases employed by the relevant literature are often biased towards a minority of large exporters, they distort a reality made up by a majority of small exporters, also called micro-exporters, which in Spain represent more than half of all exporting companies every year. By focusing the analysis of the data on those firms which best represent the large number of small exporters, Chapter II explores if, on average, new micro-exporters do not have higher productivity levels than non-exporting firms before entering the export market and if the SS effect does not have a significant effect on new micro-exporters.

Chapter II adds to the current international trade literature by presenting an export entry conceptual framework to understand the export entry behavior for the large number of micro-exporters, due to their low productivity levels and few resources, and the way their export entry strategies interrelate with the SS effect. It also provides empirical support for the hypothesis that new micro-exporters do not have higher productivity levels than non-exporters before starting to export, presenting evidence against the existence of significant SS effects on new micro-exporters. This reality of new micro-exporters has important implications for business strategy on export entry and for economic policy, especially on the impact of export promotion programs (EPP).

The structure of Chapter II is organized as follows: section 2 reviews the theoretical and empirical literature relevant to the SS effect. Section 3 proposes and presents an export entry conceptual framework for new small exporters with low productivity and scarce internal resources, also called new micro-exporters, which allows to explain the absence of significant SS effects for new micro-exporters. Section 4 includes the research model and the variables of investigation. Section 5 presents the methodology and data used for testing. Section 6 interprets the results obtained by the

[5] There is not a clear cut division between export facilitating and productivity enhancing initiatives as, for some cases, one activity can support both processes. For instance, a product innovation can facilitate entry into exports but, at the same time it can foster productivity.

descriptive and econometric analyses of the data, including several robustness checks. And, section 7 explains the main results, the limitations of the investigation, the most important implications at business strategy level and at economic policy level, and it ends with potential avenues for further research. Chapter II finishes with a section of annexes which contains an extended review of the relevant empirical literature on the SS effect, as well as additional statistical data, including a non-parametric test of the hypothesis under investigation, to conclude with the biographical list of the papers mentioned in the chapter.

2. The self-selection effect

2.1. Background

The SS effect is rooted into several theoretical models of industry dynamics which link productivity heterogeneity among firms with diverging paths of entry, growth and death (Jovanovic, 1982; Hopenhayn, 1992; Ericson and Pakes, 1995). These industry dynamic models show how firms with different levels of productivity take different decisions to enter, remain in and exit the market, but they differ in the source of firm uncertainty. In Jovanovic (1982) model the company is uncertain about its productivity, in Hopenhayn (1992) model there are random variations to the productivity of a company and in Ericson and Pakes (1995) model there is uncertainty on the company's return on investment (ROI).

For instance, in Hopenhayn (1992) model a firm enters the market by paying an entry cost. Afterwards, the company is given a random initial productivity level from a common distribution function and it decides how much to produce. Every year, the firm chooses whether to remain in the market by paying a fixed cost or to exit the market. After making this decision, the firm experiences a random productivity shock, where firms with high productivity have a higher probability of drawing a high productivity level, and then the company decides how much to produce for the year. A firm only enters and remains in the market if the expected future profit is positive, which depends on the productivity level and the entry and annual fixed cost. Thus, the model predicts a minimum productivity level for new entrants. Over this level a firm enters and remains in the market. Below this level the firm does not enter or exits the market, generating a continuous flow of newcomers and quitters due to random productivity shocks (Hopenhayn, 1992).

This industry dynamic model implies that entering firms are concentrated amongst the most productive firms, a concept that can be applied to the export activity, where non-exporters with high productivity in year *t-1* are more likely to become exporters in year *t* than low productivity non-exporters. As a consequence, domestic companies which become new exporters have a higher initial productivity compared to those that remain non-exporters (Aw et al., 2001).

The importance of paying an entry cost to access the export market is stressed by the hysteresis literature (Baldwin, 1988; Dixit, 1989; Baldwin and Krugman, 1989). This authors develop the sunk-cost model which assumes that non-exporters must incur in a sunk entry cost to access the foreign market. This sunk cost, which is a one-time fixed cost for new exporters, must be paid before these new exporters start to export and every time after they exit and re-enter the foreign market. Baldwin (1988) defines the sunk entry cost as the required cost to sell in a specific foreign market such as the cost of setting up a distribution and after-sale service network, the cost of establishing a brand name through advertising and the cost of bringing the foreign product into conformity with domestic health and safety regulations.

The sunk-cost model claims that when a firm is hit by a positive productivity shock, either external or internal, it pays the sunk entry cost to become an exporter. Whereas when the productivity reverts to its original level, the firm continues exporting to avoid paying again the cost to re-enter the market in a future, even if the firm loses money in the meantime. This persistence of exporters in the international market is known as export hysteresis. Under export hysteresis a firm that exports in year *t-1* has a higher probability of being an exporter in year *t* than a non-exporting company (Baldwin, 1988). As any entry barrier, the sunk cost reduces the expected profit of exporting, makes less appealing to become an exporter, and creates persistence in the export status of a firm given the specific investment required to access the foreign market.

The sunk-cost model predicts that in the presence of an export entry cost only the most productive firms, those that can afford to pay the sunk entry cost required to start exporting, enter the international market and, once they are exporting, they tend to remain exporters to avoid paying again the sunk entry cost. An effect better known as export hysteresis.

2.2. Theoretical framework. Hints for micro-exporters

Building on the export hysteresis literature and Hopenhayn (1992) industry dynamic model, Melitz (2003) develops the New New Trade Theory (NNTT) mainstream model by incorporating a constant elasticity of substitution (CES) demand and monopolistic competition, as in Krugman´s New Trade Theory (NTT) models (Krugman, 1979; Krugman, 1980; Krugman, 1981), to understand the long term effects of trade on firm behavior and firm performance, and to explain the endogenous selection of heterogeneous firms into exports (Melitz, 2003).

In Melitz (2003) model, domestic firms already know their productivity, as they are actively selling in the home market, and in order to export, they must pay a fixed entry cost which is independent of the volume exported, per market and per year. The export entry cost includes activities such as market research, marketing, or setting up a distribution network in the foreign market. This extra entry cost to access the export market creates a higher productivity cutoff level for exporters since firms only enter the foreign market if the expectation of future profits from exporting covers the entry cost. Over this cutoff level, firms enter and remain in the export market creating a SS effect of the most productive firms into exports. Below this level firms do not enter the international market. This model explains why there are firms which produce only for the domestic market (non-exporters) while others, a minority, also export (exporters). After entering the international market, every year a firm faces a constant probability of being affected by a bad productivity shock which forces it to exit the export market (Melitz, 2003).

Melitz (2003) model predicts that an increasing exposure to trade such as a transition out of autarky, an increase in the number of available trading partners, a reduction of the export entry cost, or a reduction of the variable cost to trade (tariffs, transport cost) raises the domestic market productivity cutoff level due to the fact that local firms must compete in the home market against more productive foreign competitors which take away part of their market share. In a more open economy, all firms lose domestic sales except the least productive firms, which are unable to compensate the shrinking domestic market share with export sales. They can no longer earn positive profits and are forced out of business. Melitz (2003) model represents the increasing market competition of trade through the domestic labor market, the only factor of production. As more firms compete for a common source of labor, the increase in labor demand by more productive firms in order to attend to exports, raises the real wage and forces the least productive firms to exit the domestic market as they are unable to bear the burden of increasing production costs without incurring in losses (Melitz, 2003).

The existence of an export entry cost affects the distribution of trade effects among heterogeneous firms. The result is that exposure to trade increases national welfare through a more efficient reallocation of factors of production among firms without (necessarily) an increase in firms´ productivity or a technology frontier expansion. An increasing exposure to international trade creates a Darwinian selection process that reallocates resources towards more efficient firms and contributes to a national increase in the aggregate productivity and welfare levels (Melitz, 2003). With trade, the most productive firms thrive and grow by increasing their global market share and their profits through exports, less productive firms remain in the domestic market, but they do not export reducing their home market share and revenue, and the least productive firms are driven out of business. Trade offers new profit opportunities to productive firms which can afford to cover the export entry cost at the expense of low productive firms (Melitz, 2003).

This standard model has been employed many times within the NNTT to create adaptations and extensions (Helpman et al., 2004; Das et al., 2007; Bustos, 2011; Eaton et al., 2011; Ruhl and Willis, 2017)[6]. One of them is an extension by Chaney (2008), who incorporates market heterogeneity in the form of different entry costs and market sizes per export destination. In Chaney (2008) model a firm chooses a subset of countries to export its output and sets different prices in each market to maximize its profits. On the one hand, when the export entry cost increases, the number of exporters in a market (known as extensive margin) decreases because less firms find it profitable to become an exporter. And when the entry cost declines, the number of exporters increases because new and less productive firms enter the export market.

On the other hand, when the elasticity of substitution of the traded product decreases, the number or exporters increases as products do not compete on price but on exclusivity and consumers are willing to buy more foreign varieties at a higher price. Lower levels of elasticity of substitution induces new exporters to enter the market as they are sheltered from a competition based on prices, since low productivity does not become a severe disadvantage Chaney (2008). However, exports

[6] For alternative approaches to modeling firm heterogeneity and trade refer to Bernard et al., (2003) and Yeaple (2005).

per firm (known as intensive margin) are limited as exporters find it difficult to increase their market share because customers are relatively insensitive to price differences and their products do not permeate other market niches.

Chaney (2008) demonstrates that the right mix of low export entry costs plus low elasticity of substitution creates the right conditions for firms with low productivity to enter the export market catering the needs of market niches, but severely limiting the volume exported. This model leaves the door ajar for small exporters with low productivity levels to enter into countries with low export entry costs and market niches with low elasticity of substitution.

Arkolakis (2010) offers an extension of Chaney (2008) model to explain the existence of small exporters in the presence of export entry costs. Arkolakis (2010) departs from Melitz (2003) and Chaney (2008) models in the demand structure, where the entry cost is no longer an exogenous fixed cost but a variable cost which increases with the number of consumers reached. Therefore, the entry cost is part of an endogenous decision of the firm.

Arkolakis (2010) model proposes that the first decision of a firm is whether to export or not to a given market. In order to enter the market, a firm must incur in a marketing cost which includes the cost of identifying and contacting potential consumers, developing new goods or adapting the existing products to the foreign taste, setting up distribution channels to make available the products in the export market and promoting the goods among foreign consumers. A profit maximizing firm only enters the market if it makes a profit by reaching its first costumer, which means that the marginal revenue received from the first costumer must be higher than the marginal cost of reaching the first client. Nevertheless, when the marginal revenue from the first costumer is lower than the marginal cost of reaching the first client, the firm does not enter the international market, remaining a non-exporter which competes only in the domestic market (Arkolakis, 2010).

The second decision of a firm is the amount of costumers the firm wants to reach in a given market (called new consumers margin) due to the marginal that the marginal cost of reaching new clients is positive and incremental. It is rational to assume that any marketing effort starts with those activities which deliver the best costumer reach and, as the marketing effort increases, every additional marketing spending becomes less efficient (Arkolakis, 2010). For instance, during a marketing campaign a repeated television advertisement has a decreasing probability to be seen for the first time by any given person, proportionally to the percentage of people who have seen the advertisement. The more consumers an exporter targets, the more repetitions are needed to ensure that all consumers have seen the add. As the cost of reaching new clients increases, only the most productive firms find it profitable to pay the increasing marketing cost to reach a larger set of clients. While low productivity firms target few costumers and become small exporters by incurring in low export entry costs.

Arkolakis (2010) model can to explain the existence of so many firms exporting tiny amounts abroad, as the entry cost is no longer fixed but an endogenous decision on the part of the exporter, where low productivity firms find more profitable to reach a small set of consumers and choose to incur in low export entry costs. Moreover, Arkolakis (2010) model is better at explaining the high turnover which experiences small exporters as they face lower export entry costs compared with large exporters and, as a result, the opportunity cost to exit the market is much lower, creating a lack of export hysteresis.

Following the dynamic sequential demand accumulation process modeled by Arkolakis (2010), the latest developments in the NNTT theoretical literature regarding the SS effect take into consideration that the export dynamics for most new exporters are quite different compared with those of consolidated exporters. New exporters often start by exporting small amounts and, conditional on continuing the export activity, gradually increase the amount exported. The slow growth of exports for new exporters can be attributed to several factors such as the trial of different international markets to find profitable ones (Albornoz et al., 2012), the fine-tuning of the relationship between exporter and importer (Eslava et al., 2015), the constraints of working capital faced by the firm to expand foreign operations (Kohn et al., 2016), the constraints in production capacity to serve the export market (Rho and Rodrigue, 2016), and the necessity to build-up foreign demand (Ruhl and Willis, 2017). The gradual growth of exports pushes into the future the profits from exporting and reduces the present value from exporting and the export entry cost required in order to keep most firms from exporting. Besides, a smaller export entry cost allows smaller and less productive firms to enter the export market, but as they are closer to the entry productivity threshold, they are more likely to exit sooner (Ruhl and Willis, 2017). Therefore, as many of these new exporters leave the export market during the initial years with no time to build-up an ample foreign demand, they remain small exporters.

In summary, NNTT theoretical models have evolved from predicting that only the most productive firms become exporters, as they can absorb the high export entry cost to become exporters, to include heterogeneity in the export entry cost which varies with the endogenous export entry decision of a firm. In models with endogenous export entry cost small firms with low productivity choose to incur in low export entry costs to access the foreign market, but they limit their exports and become small exporters, with a high turnover rate in and out of the export market.

2.3. Empirical literature. Evidence in favor of the self-selection effect

The seminal publication by Bernard and Jensen (1995) marks the beginning of the NNTT literature. In their paper, the authors do not check for the SS effect, as they only try to confirm that exporters are more competitive and more productive than non-exporters (known as the exporter premium). Nevertheless, they find indirect evidence in favor of the SS effect of the most productive firms into exports. Bernard and Jensen (1995) employ detailed plant-level data on United States (US) manufacturing establishments, for the period 1976 to 1987, and find that exporters have been successful in the past, measured in terms of employment, sales and wages, so it is likely that success helps firms to become exporters. Bernard and Jensen (1995) obtain indirect evidence that the most productive plants tend to become exporters, supporting the existence of a SS effect.

It is Bernard and Wagner (1997) who test for the first time the SS hypothesis. They argue that if good firms become exporters, they must outperform non-exporters before they begin to export. To verify this hypothesis, they select a subsample of plants which did not export three years in a row (*t-3*, *t-2*, *t-1*) and compare the performance of firms which become exporters in year *t* versus firms that remain non-exporters in year *t*. Bernard and Wagner (1997) conclude that exporting plants in the State of Lower Saxony (Germany), for the period 1978 to 1992, have better performance attributes such as output, wages and labor productivity compared with non-exporters before they begin to sell their products abroad, whereas with low statistical significance levels. Therefore, Bernard and Wagner (1997) obtain positive, if weak, evidence in favor of the SS effect.

To distinguish the correlated outcome (exporters are more productive) from the causal relationship (exporting increases productivity), Clerides et al., (1998) estimate a two-equation model consisting of a firm's decision to participate in the international market and the firm's cost function. They use plant-level panel data for Colombian, Mexican and Moroccan manufacturing firms, for the period 1981 to 1991, to conclude that relatively efficient plants, measured by their average variable cost and by their labor productivity, are more likely to become exporters. Clerides et al., (1998) also find that the export entry cost is significant to explain why exporters are a minority, finding evidence that supports the existence of the SS effect.

Later on, Bernard and Jensen (1999) compare the average labor productivity, measured as value added per worker, of groups of plants which undergo the transition pattern from non-exporters to exporters, to test if domestic firms which become exporters in year *t* are more productive in previous years compared with domestic firms which remain non-exporters in year *t*. Bernard and Jensen (1999) obtain on a sample of US manufacturing plants, from 1984 to 1992, that more productive firms self-select into exports after controlling for industry, state and year, finding evidence in favor of the SS hypothesis.

In order to test for the SS, Aw et al., (2000) employ a similar empirical strategy to Bernard and Jensen (1999) by comparing the average productivity of groups of plants which undergo different transition patterns. They use data for South Korea and Taiwan´s five major export industries: apparel, electrical machinery, textiles, transportation equipment and plastics, for the 1980s and the early 1990s, and they obtain strong evidence in favor of the SS effect. In all five industries for both countries, new exporters have higher productivity levels, prior to entry, compared with domestic firms which remain non-exporters, except for Korean new exporters in two industries, where the productivity differential is positive but not statistically significant. At any rate, Aw et al., (2000) obtain results which are consistent with the SS hypothesis and show that high productivity leads to exports.

Again, Bernard and Jensen (2004a) with the same sample of US manufacturing plants, for the period 1983 to 1992, follow a similar empirical strategy to Bernard and Jensen (1999) to compare the average productivity of groups of plants which undergo the transition pattern from non-exporters to exporters during five-year intervals. They conclude that new entrants into exporting have productivity levels significantly above continuing non-exporters two years and one year before they start exporting, after controlling for industry and time. Bernard and Jensen (2004a) results suggest that highly productive firms enter the export market, supporting the existence of a SS effect into exports.

After these pioneering works, more and more papers which employ firm-level datasets for different countries, for different years, and with various statistical methodologies consolidate the opinion that there is ample evidence to support the SS effect as reported in table a11 (in annexes).

For Spain, Delgado et al., (2002) use data for Spanish manufacturing firms, from 1991 to 1996, to define a reference group of firms which did not export in 1991 and they divide it into firms that become exporters between 1992 and 1996 and firms that remain non-exporters. Delgado et al., (2002) compare the productivity level for both groups of firms in the year 1991, before entry into exports takes place, with a non-parametric approach (Kolmogorov-Smirnov test) and they find that the productivity distribution of entering exporters stochastically dominates the productivity distribution of non-exporters. As the average productivity of new exporters unconditionally dominates the average productivity of non-exporters, Delgado et al., (2002) conclude that these results signal the existence of a SS effect as exporters seem to be more productive than non-exporters.

Fariñas and Martín (2007) with the same database of Spanish manufacturing firms than Delgado et al., (2002), but this time for the period 1990 to 1999, employ a regression analysis to calculate the average productivity difference between entering exporters and non-exporters, using a similar specification to Bernard and Jensen (1999) and Bernard and Jensen (2004a). With this data, they confirm that entering exporters have, on average, higher labor productivity levels than non-exporters before they start to export after controlling for age, industry, size, time and other firm characteristics. Thus, Fariñas and Martín (2007) corroborate the existence of a SS effect among Spanish manufacturing firms.

Máñez et al., (2009) also with the same database of Spanish manufacturing firms, for the period 1990 to 2000, use a probit specification to find that firms with high labor productivity in year *t-1* self-select into exports in year *t*. Additionally, they find that firms which implement process innovations in year *t-3* increase their productivity in year *t-1* and, therefore, they increase the probability of self-selecting into exports in year *t*, so that process innovation can create an indirect effect of SS into exports. Finally, Máñez et al., (2009) employ a stochastic dominance technique similar to Delgado et al., (2002) to test whether the productivity distribution in year *t-1* for firms which enter the export market in year *t*, stochastically dominates the productivity distribution in *t-1* for firms that remain non-exporters in year *t*. The results obtained by Máñez et al., (2009) suggest that the productivity distribution in year *t-1* for new exporters stochastically dominates the productivity distribution in year *t-1* for non-exporters, supporting again the existence of a SS effect of the most productive firms into exports.

And, Minondo (2014) employs a Spanish services firms database for the period 2001 to 2007. He tests with a regression analysis if new exporters have, on average, higher labor productivity compared to non-exporters before beginning to export, controlling for industry, size and time. He finds that export starters are already more productive than non-exporters even three years before beginning to export, validating the SS hypothesis. Moreover, Minondo (2014) obtains that the productivity differential between future exporters and non-exporters rises as firms approach the entry year, suggesting that firms may consciously prepare to export and gives support to existence of the SS effect.

Due to the fact that all these studies employ different testing methods, with different productivity measures, applied to different countries, for different years, to test the existence of the SS effect, the International Study Group on Exports and Productivity (ISGEP) homogenize the testing protocol by using comparable firm-level panel data for 14 countries (including Spain) with a common methodology to investigate the SS hypothesis (ISGEP, 2008). They select all firms which did not export between year *t-3* and *t-1*, and calculate the average difference in labor productivity in year *t-3* between those firms which start to export in year *t* (export starters) and those firms which remain non-exporters in year *t* (non-starters). The regression analysis, after controlling for industry, size and wages, shows that the labor productivity of entering exporters is significantly higher than the labor productivity of non-exporters three years before entering the international market for most countries, including Spain. ISGEP (2008) results indicate that new exporters are more productive than non-exporters before they start to export, presenting evidence which is aligned with the SS effect.

To sum up the NNTT empirical literature which studies the SS effect Wagner (2007) performs a meta-analysis of 54 empirical studies published between 1995 and 2006 with data from 34 countries, to find overwhelming support in favor of the SS effect[7]. And Wagner (2012), with another meta-analysis for 11 countries and 25 papers published after 2006, concludes that there is enough evidence to validate the hypothesis which supports that exporters are more productive than non-exporters in the years before they start to export, with an overwhelming support in favor of the SS effect all over the world[8].

In a nutshell, the existing theoretical NNTT literature on the SS hypothesis characterizes the SS effect as a filter created by the existence of high export entry barriers created by the additional costs where firms have to incur to access the foreign market which deter low productivity firms from becoming exporters, as they do not find it profitable to pay the high export entry costs required to initiate exports. Nevertheless, this characterization of the export entry cost has evolved over time to consider that small firms with low productivity and few resources might consciously select export entry strategies which incur in low export entry costs at the cost of reaching less consumers, explaining the existence of small exporters and their high turnover rate in and out of the export market.

The theoretical literature on the SS hypothesis which proposes the existence of relevant export entry costs which deter less productive firms from becoming exporters, is supported by the NNTT empirical literature which, after more than 20 years of studies, finds compelling evidence in favor of the selection of the most productive firms into exports. A great majority of papers conclude that new exporters have, on average, better performance characteristics compared with non-exporters before starting to export, specifically higher levels of productivity, obtaining ample evidence in favor of the SS effect for many countries, many industries and for most firms, with only a few exceptions[9]. The mounting evidence of empirical results corroborate the proposition that good firms (the most productive firms) tend to become exporters and support the validity of the SS hypothesis, which has become a center pillar of the NNTT.

[7] The meta-analysis includes undeveloped and developing countries such as: Burundi, Cameroon, Cote d'Ivoire, Ethiopia, Ghana, Indonesia, Kenya, Malaysia, Morocco, Philippines, Tanzania, Thailand, Zambia and Zimbabwe.
[8] This paper includes some countries not mentioned yet such as: Croatia, Cyprus, Greece, Hungary, Iceland, India, Japan, Liechtenstein, Netherlands, Portugal, Russia and Switzerland.
[9] Among others, Greenaway et al., (2005) for Swedish firms, Bravo et al., (2014) for Chilean firms, and Cruz et al., (2017) for Mozambican firms.

3. Conceptual framework. The export entry cost and the self-selection effect for micro-exporters. Are they negligible?

The SS effect and the export hysteresis are caused by the existence of large export entry barriers. These entry barriers impose high export entry costs in the form of market research, product innovation, packaging adjustment, new distribution systems and bureaucratic procedures, among others. A profit-maximizing firm enters the export market if the present value of all the future profits from exporting is higher than the entry cost. Therefore, the export entry cost creates a higher productivity cutoff level which differentiates exporters from domestic companies as only the most productive firms, with lower costs or higher sales margins, obtain enough profits from exporting to absorb the export entry cost, which create a SS effect of a minority of highly productive firms into exports.

Nevertheless, the existence of high export entry barriers is in stark contrast with the presence of so many firms which export small amounts, as they will not find it profitable to absorb the high export entry cost[10]. For instance, Eaton et al., (2011), with an extensive nationwide firm-level database, report that the smallest 25 percent of French exporters in a particular foreign market, sells, each of them, below Usd 10,000 in that market per year, and that the modal exporter sells only to one foreign destination. Besides, the existence of high export entry barriers is not congruent with the extreme concentration of trade across very large exporters coexisting with a majority of very small exporters. This granularity of exporters have been documented among many other countries, not only in US, where the largest 1 percent of exporters control almost 80 percent of the total volume exported (Bernard et al., 2018), but also in Europe in countries such as Germany, France and The United Kingdom (UK), where the top 1 percent of exporters account for about half of the total national exports (Mayer and Ottaviano, 2008), and in Spain, where the largest 1 percent represents more than 70 percent of the national exported volume (Lucio et al., 2017). Furthermore, a high export entry cost is inconsistent with the most recent theoretical NNTT literature that

[10] Some papers that estimate the value of the export entry cost give astounding values: Usd 350,000 to Usd 450,000, at 1986 prices, for Colombian manufacturing firms from 1981 to 1991 (Das et al., 2007). Usd 300,000 to more than Usd 500,000, at 2000 prices, for Chilean chemical firms from 1995 to 2005 (Morales et al., 2011). Usd 2 million to Usd 3 million, at 1987 prices, for US industrial firms from 1987 to 2006 (Lincoln and McCallum, 2016). And, Usd 870,000 to Usd 2.6 million at 2000 prices, for Chilean chemical and food firms, from 1995 to 2005 (Dickstein and Morales, 2018).

embraces variable entry costs which increase as the exported volume expands, and where small exporters incur in small export entry costs (Arkolakis, 2010; Ruhl and Willis, 2017).

In order to reconcile the existence of an important group of micro-exporters, which make up for a very large share of all national exporters in many countries, with the existence of export entry costs, this thesis proposes an export entry framework for new micro-exporters that allows us to explain the existence of micro-exporters with the existence of export entry costs, reconciling the traditional NNTT literature with this neglected group of small exporters.

The export entry framework proposes that all firms face three decisions before becoming exporters (Máñez et al., 2009): i) to which country or countries to export, ii) what product/s to export, and iii) how to enter each market by type of product (or distribution channel). These three export entry decisions combined determine the optimal number of foreign customers reached and, subsequently, the quantity exported and the total export entry cost.

To overcome the export entry barriers, small firms with low productivity and few resources tend to choose those export entry strategies which minimize both, the entry cost and the required resources, to access the export market (capital, knowledge, personnel, risk, time). Therefore, entry into the export market for this type of firms does not come through high productivity levels, but through a minimization of the entry cost. Firms with low productivity do not await to increase their productivity levels, but they consciously select to reduce the export entry cost to facilitate them to become exporters by employing these three different export entry strategies:

1. **Gravitational market strategy.** The export entry cost varies across countries given the existence of country-specific impediments in relation to trade, as a consequence of imperfect information and formal and informal barriers which separate domestic and foreign markets (Blanes et al., 2008). Tinbergen (1962), the forefather of gravitational trade models, proposes that there is a natural volume of trade among countries based on the gravity model. The gravity model employs the gravitational force concept as an analogy to explain the volume of trade between countries using the standard formulation of the gravity law equation $GF_{ij} = \frac{M_i \times M_j}{D_{ij}} \; i \neq j$. Standard gravity models often establish the gross national product (GNP) of two countries (M_i and M_j) as an attraction force (GF_{ij}) which increases bilateral trade flows and distance between countries (D_{ij}) as

a repelling force which reduces trade flows. Any deviation from the natural volume of trade must be explained by other factors (barriers and stimuli to trade), such as the positive effect on bilateral trade of sharing borders or belonging to a free trade agreement (FTA) (Tinbergen, 1962). This pioneer model has been expanded to include new factors such as the positive effect on trade from belonging to a currency union (Rose, 2000; Barro and Tenreyro, 2007), for being member of the World Trade Organization (WTO) (Rose, 2004; Subramanian and Wei, 2007), and for sharing a common major religion, language or colonial ties (Helpman et al., 2008) among other stimuli, as they reduce the cost to export to other countries (Egger and Lassmann, 2015).

By exporting to a gravitational market, low productivity firms with few resources reduce the export entry cost which they have to pay in order to enter the market when it is compared to entering a non-gravitational market. Therefore, on average, more productive firms enter more distant markets (ISGEP, 2008), while small firms with low productivity prefer to enter close countries (Bernini et al., 2016) because companies engage in international trade with neighboring countries which have similar culture, language, level of development and education, political systems, etc. to avoid risks and uncertainty to reduce export entry costs (Kontinen and Ojala, 2012).

For instance, a Spanish company by entering a gravitational market with similar characteristics to the domestic market, such as Portugal, minimizes penetration costs as it reduces or eliminates translation costs, currency exchange expenses, tariffs, product adaptation costs to foreign standards and regulations, transport costs, market research expenses and the likes. Nonetheless, exports become confined to the gravitational market, missing export opportunities in non-gravitational markets such as Australia, China, India or Japan.

This export entry strategy is consistent with the empirical data as documented by Eaton et al., (2004), where most French exporters export to only one country, and Arkolakis and Muendler (2013), where the modal exporter ships to only one foreign destination for Brazilian, Chilean, Danish, French and Norwegian exporters. Moreover, Mayer and Ottaviano (2008) report that a large number of small exporters in Belgium and France are able to cater small volumes for gravitational foreign markets and Bernard et al., (2009) suggest that the largest US exporting firms are more likely to trade with difficult markets, while Bernard et al., (2018) conclude that almost 40 percent of US exporters sell to one foreign country only, accounting for less than 2 percent of

US exports. The export data for several countries seems to be aligned with the concept of the micro-exporter, as in most countries there is an ample group of exporters which export just to a few gravitational markets tiny amounts per year.

2. **Existing product strategy**. Exporting an existing product with none or minor adaptations to the foreign market minimizes the entry cost associated with product research and development (R&D). Even if product development activities come with a free standard technology (blueprint), the firm's resources endowment and institutional reality will require tinkering and adaptation (Evenson and Westphal, 1995) so that firms can face considerable cost uncertainty when developing a product (Hausmann and Rodrik, 2003). A study with exporters developed by the consulting company First Washington Associates (1991) for the World Bank (WB) identifies that product development is a marginal activity among new exporters as only one out of ten exporters develop a new product in order to access the foreign market, while one out of four exporters adapt an existing product and two out of three exporters export the same product. Among non-exporters, more than half answer which they would enter a foreign market only exporting an existing product, one third report that they would adapt an existing product and 15 percent reply that they would develop a new product to increase its quality or to adapt the design to the local preferences.

Nevertheless, with non or minor product adjustments to foreign requirements and tastes, exports are restricted to small market niches per country or might not be consumed at all, missing potential opportunities to export different products, to different market niches and for different countries. For instance, a Spanish exporter will incur in less export entry costs if it exports a product of its portfolio that sells well in Spain with none or minor adaptations to the foreign market. Nonetheless, giving the diverging tastes and regulations of foreign markets, the product might not be allowed to be sold in some countries as it may not comply with safety regulations, labelling and other legal requirements. Or, if it is allowed to enter the market, it might not find an ample base of consumers which may have different needs other than the Spanish market, so the exported volume will be low.

Again, the international trade data supports the existence of numerous micro-exporters in most countries which sell only one or two products with none or minor adaptations to foreign markets, but which obtain tiny exported volumes per year. This is documented by Arkolakis and Muendler

(2013), who find that the median exporter in Brazil, Chile, Denmark, France and Norway ships abroad only one or two products, by Mayer and Ottaviano (2008), who report that 35 percent of French exporters export only one product but they account for less than 2 percent of national exports and by Bernard et al., (2018), who find that more than half of US exporters export only one product and represent less than 4 percent of US exports. Again, the data supports the existence of numerous micro-exporters in most countries which sell only one or two products with none or minor adaptations to foreign markets, but which obtain tiny exported volumes per year.

3. **Contractual channel strategy**. Export entry strategies are classified according to Hennart (2000) in contractual and investment strategies. A contractual strategy includes agreements with third parties such as distribution agreements, licensing and franchising which reduce the cost, risk and time of setting up a distribution network in a foreign country. Whereas, investment strategies imply capital investment in a foreign country such as joint ventures, greenfield projects developing a new subsidiary and brownfield projects through the acquisition or participation in a foreign company, which increases the time and resources needed to enter the foreign market (Hennart, 2000).

Contractual strategies, such as exporting through an international distributor, facilitate the export entry process as they help domestic firms to match with foreign clients and reduce information asymmetries and trade costs (Feenstra and Hanson, 2004; Akerman, 2018). International distributors not only provide transportation, customs and shipping services, but also information on buyers, prices and standards in foreign countries. As a result, they reduce the export entry information cost and the degree of uncertainty (Roberts and Tybout, 1997). Small firms with scarce resources may find the cost associated with market research, searching for clients, setting up foreign currency accounts, hiring specialized accountants and custom declarants, finding financing, learning and dealing with foreign bureaucratic procedures and maintaining a foreign distribution network, too costly to bear. Therefore, they prefer to export via an intermediary in order to reduce the export entry cost (Bai et al., 2017). The study of First Washington Associates (1991) for the WB reports that non-exporting firms which want to export are twice more likely to think on exporting for the first time by entering the market through a contractual channel strategy than through an investment channel strategy in order to reduce the cost and risk associated with export entry.

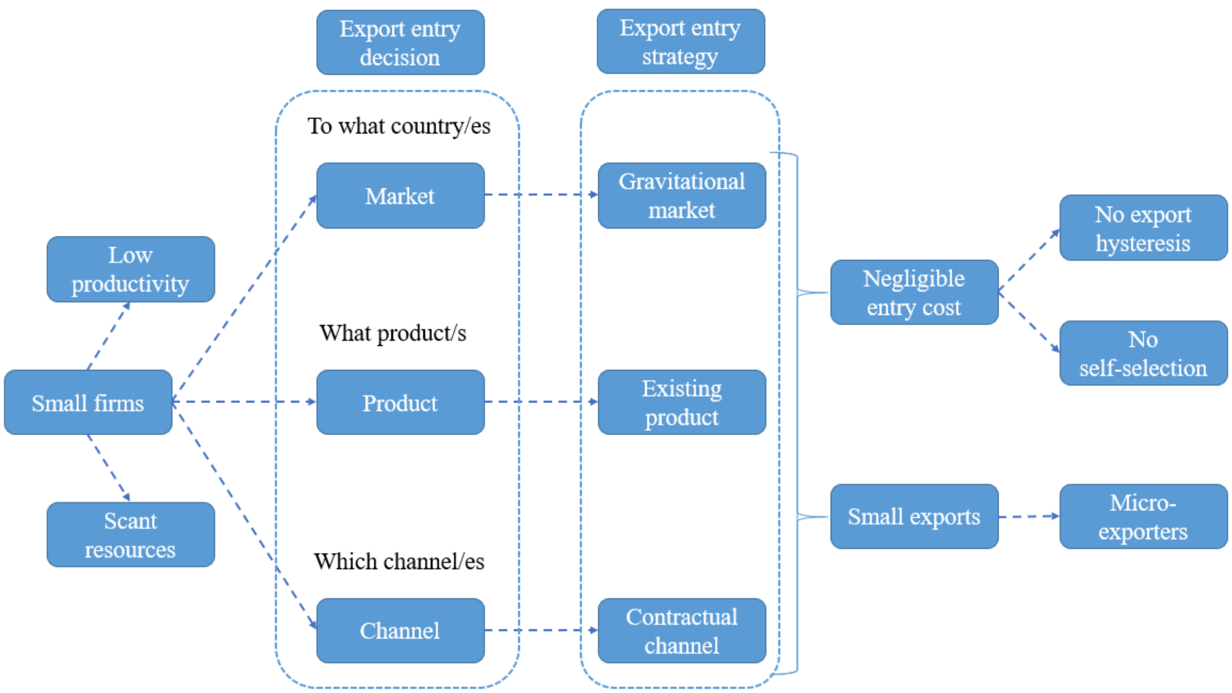
Nevertheless, contractual strategies limit the exporter's capacity to build up more sophisticated distribution networks in foreign countries, to be in direct control of the commercial process and to reach a larger set of consumers, compared to an investment strategy. For instance, a Spanish exporter will reach more clients by developing its own sales network in every state of US than just signing a distribution agreement with an international distributor who which might restrict its operations to only one state and which might have more clients to represent, giving a marginal attention to its Spanish partner. However, the first option comes at a high cost, while the distribution agreement is less time and resources consuming.

This export entry strategy for small firms with low productivity is supported by empirical studies as reported by Atkin et al., (2017) who find that the process of exporting through an intermediary is more common for small firms than for large firms. Also, Felbermayr and Jung (2008) and Ahn et al., (2011) report that intermediaries are used by relatively smaller and less productive firms who find it difficult to enter the export market on their own while the World Bank Enterprise Surveys for the last decade report that exporters with five or less employees employ almost twice as often intermediaries to export than other exporters do.

These three export entry strategies are not independent but, on the contrary, highly complementary. For instance, if a Spanish manufacturer wants to export an existing product within its portfolio (e.g. transportation equipment), selecting a gravitational market such as Germany it is a good choice because it shares with Spain the same currency, as well as the European Union (EU) common market with no tariffs, common quality standards and safety regulations. All this facilitates the entry of the Spanish product into the German market with no need of major product adaptations or innovations. At the same time, as gravitational markets often enjoy larger bilateral trade flows, the network of commercial relationships between both countries develops to a greater extent and the pool of international distributors grows accordingly, making it easier for a Spanish manufacturer to find the right distributor for the German market than for a non-gravitational market such as Japan or New Zealand.

When a firm is selecting its export entry strategies it must take into account that all these export entry strategies combined severely limit the number of foreign clients who can be reached in the export market and, subsequently, the volume of sales abroad. As shown in figure 5, the export entry framework allows to explain why firms with low productivity and scarce resources become micro-exporters as they tend to select export entry strategies which reduce the export entry cost to (almost) a negligible level, so that the SS effect does no longer apply to them. Furthermore, since the export entry cost is (almost) negligible, it allows smaller and less productive firms to enter the export market, but as they are closer to the entry productivity threshold they are more likely to exit sooner (Bernini et al., 2016), challenging the existence of the export hysteresis for new micro-exporters and explaining the high turnover rate of micro-exporters in and out of the export market.

Figure 5. Conceptual export entry framework for small firms (new micro-exporters) and the self-selection effect



Source: Own elaboration.

The export entry conceptual framework supports the postulate that the export entry cost is no longer fixed but endogenous according to the firm's decision on how to enter the export market (Arkolakis, 2010). The export entry cost becomes firm-specific because, for every firm, the three export entry strategies might not be available or might not have similar effects, creating heterogeneous export entry costs. For instance, a Spanish new exporter will reduce to a great extent the export entry cost by entering a gravitational market such as Portugal or France, inside the EU and the Eurozone, due to the fact that they use the same currency and have homogeneous regulations and zero tariffs, compared to what a Moroccan new exporter will reduce the export entry cost by entering a gravitational market such as Spain because it still faces exchange risks, tariffs and technical barriers in the form of higher quality standards and safety regulations. Therefore, the same export entry strategy can have different effects depending on the exporter. Moreover, an export entry strategy might not be available for all exporters. For instance, a Spanish consumer goods exporter can select a contractual channel to export via a distributor, whereas a high-tech Spanish exporter might be unable to employ a contractual channel strategy if the after-sale service and the proprietary knowledge are paramount to its operations and it cannot hand over the control of these sources of comparative advantage to a third party.

The firm-specific heterogeneity in the availability and effects of the different export entry strategies allows us to explain why not all domestic firms become exporters. It may be plausible that a domestic firm does not have an adequate product within its portfolio to initiate exports and that it cannot afford to adapt the existing product or create a new one to enter the foreign market, remaining a non-exporter. Or it also might happen that a domestic firm does not find a suitable international distributor for its product, staying out of the export market.

To conclude the export entry conceptual framework, there are several complementary export entry strategies that allow to minimize the export entry cost to (almost) a negligible level: i) to export to a gravitational market, ii) to export an existing product, and iii) to export via a contractual channel. Firms with low productivity and few resources can combine these three export entry strategies so that they do not await to increase their productivity in order to start exporting but, on the contrary, reduce the export entry cost to enter the international market. Given the (almost) negligible export entry cost attained by these companies, they are no longer affected neither by the SS effect of the most productive firms into exports nor by the export hysteresis. Owing to this, they face high turnover rates in an out of the export market. However, these complementary export entry strategies come at a cost, as they greatly limit the volume exported so that new entrants become micro-exporters. The end result is that small firms with low productivity and few resources are able to enter the export market averting the SS effect but they become micro-exporters with very small exported volumes, great difficulty to compete in the export market and a short life as exporters. Nevertheless, not all the domestic firms can enter the export market because of the firm-specific heterogeneity in the availability and effects of the different export entry strategies.

4. Research model and variables

Once the NNTT theoretical framework on the SS effect has been summarized, the relevant empirical literature to the SS effect has been reviewed and the export entry conceptual framework for new micro-exporters has been introduced, this section presents the research model, the hypothesis to be tested by the empirical analysis and the variables employed for the investigation.

The SS effect is defined as, ceteris paribus, the performance difference between new exporters and non-exporters before new exporters enter the international market. The performance characteristic most frequently analyzed by the NNTT literature is productivity, so the SS effect can be described as the higher productivity level of new exporters to non-exporters before starting to export, which manifests into a self-selecting process of the most productive firms into exports attributed to the high export entry cost associated with becoming an exporter (Wagner, 2007).

However, if the export entry conceptual framework is correct and firms with low productivity and scarce resources become micro-exporters which are not subject to the SS effect, there should be no productivity differential between new micro-exporters and non-exporters before entry into exports takes place. Accordingly, the following hypothesis is proposed:

H2: New micro-exporters do not have higher productivity levels than non-exporters before starting to export

To test that new micro-exporters are no more productive than non-exporters before entry into exports, the average difference in productivity in year *t-1* of those firms which did not export in year *t-1* and become micro-exporters in year *t*, called new micro-exporters, is compared to the average productivity of those firms that do not export in year *t*, called non-exporters. The productivity differential is computed from a regression of log(arithmic) productivity levels on the export status dummy and a set of control variables for each firm (usually including industry and year). The result shows the average percentage difference in productivity between new exporters and non-exporters the year before they start to export, after controlling for the characteristic included in the vector control (Wagner, 2012).

The proposed research model is as follows:

$$\textbf{(6)} \quad \log P_{it-1} = a + ß_1 \, Status_{it} + ß_n \, Control_{it-1} + e_{it}$$

where i is an index for each firm, t is an index for the year of each observation, P is firm productivity and $log\ P_{it-1}$ is the productivity logarithm for firm i in year t-1. $Status_{it}$ is a dummy variable for the current export status of the firm. $Control_{it-1}$ is a vector of control variables for firm i in year t-1, and e is an error term.

The dependent variable employed as productivity measure is labor productivity, computed as sales per worker and value added per worker, which are dependent variables commonly used in the NNTT literature to test the SS effect. Some papers that employ labor productivity as dependent variable to test the SS hypothesis are Bernard and Wagner, 1997; Clerides et al., 1998; Bernard and Jensen, 1999; Isgut, 2001; Baldwin and Gu, 2003; ISGEP, 2008; Serti and Tomasi, 2008; Máñez et al., 2009; Yang and Mallick, 2010; Temouri et al., 2013; Foster et al., 2014; Minondo, 2014; Cruz et al., 2017; Newman et al., 2017; and Siba and Gebreeyesus, 2017, among many others.

The variable productivity represents the efficiency rate in production, which means how much output is obtained from a given set of inputs, expressed as an output/input ratio. Single-factor productivity indicators measure the units of output produced per units of a certain input, where labor productivity is the most common measure. However, single-factor productivity indicators are affected by the intensity of use of other excluded inputs (Syverson, 2011). For instance, two firms might have different labor productivity levels even though they use the same production technology if one firm uses capital more intensively because it is a relatively cheaper factor of production. To overcome this problem adding control variables such as capital intensity, industry and wage and controlling for firm unobserved heterogeneity through fixed effects, absorbs much of the differences in capital intensity (Powell and Wagner, 2014).

Other researchers prefer to use total factor productivity (TFP) to measure productivity, which is invariant to the intensity use of inputs. Conceptually TFP reflects shifts in the isoquants of a production function, which represents the variation in output produced from a fixed set of inputs (Syverson, 2011). Nevertheless, TFP is not free from limitations as it might face problems regarding the output measurement for multioutput firms, the intermediate inputs valuation and the aggregation of multiple inputs in a single TFP measure. Fortunately, the heterogeneity in firm-level data is so large as to swamp any small measurement-induced differences in productivity metrics. This means that high-productivity firms will tend to look efficient regardless of the specific way in which their productivity is measured while low productive firms will show low productivity indicators (Syverson, 2011).

The independent variable of interest is the export status since the hypothesis test involves checking if new micro-exporters have higher productivity levels than non-exporters before starting to export, or not. The status is a dichotomous variable with value 1 if the firm does not export in year *t-1* and exports in year *t*, for two groups of new micro-exporters: new micro-exporters that do not export more than Eur 25,000/year and new micro-exporters that do not export more than Eur 50,000/year. And, the independent variable status takes value 0 if the firm does not export in year *t*, called non-exporter. Non-exporters are also subdivided in two groups: all non-exporters which includes firms that exported in year *t-1* and stop exporting in year *t* (also called quitters or exiters) and a less comprehensive group of non-exporters that excludes quitters, therefore it excludes firms that exported in year *t-1* and do not export in year *t*. The distinction between pure non-exporters and quitters is incorporated to take into consideration the well-documented difference between both types of firms in the NNTT literature such as in Bernard and Jensen, 1999; Aw et al., 2000; Delgado et al., 2002; Bernard and Jensen, 2004a; Hahn, 2005; Fariñas and Martín, 2007 and Barboni et al., 2012.

A specific criteria is used to define new micro-exporters. Firms only need to report exports no higher than Eur 25,000 or Eur 50,000 in year *t* and in any other consecutive year, and report no exports in year *t-1*, to qualify as new micro-exporters. This distinction allows to discriminate all those companies that start to export during the final months of year *t*, so in the subsequent twelve-month period they export more than Eur 25,000 or Eur 50,000, and those companies that become large exporters but not until they have been exporting for two or more years. The Eur 25,000/year and Eur 50,000/year thresholds have been selected given the abundance of exporting firms within these export bands since, to date, there has not been any previous categorization of new micro-exporters in the relevant literature and a new parametrization standard is required. To make the time series data comparable, the yearly export values in euros have been deflated with an industry index, base year 2010, to create constant values.

Moreover, to corroborate if biased samples render biased results and if new exporters and large new exporters have better performance characteristics than non-exporters and new micro-exporters before starting to export, three more groups of new exporters are defined: i) all new exporters, ii) new large exporters that export more than Eur 25,000/year, and iii) new large exporters that export more than Eur 50,000/year. All new exporters includes all firms that report positive exports in year *t*, no matter the volume exported, and did not export in year *t-1*. And, new large exporters (as opposed to new micro-exporters) include firms which export more than Eur 25,000 and Eur 50,000 in year *t* or any other consecutive year, and did not export in year *t-1*. As such, the group of new micro-exporters which do not export more than Eur 25,000/year (Eur 50,000/year) is complementary to the group of new large exporters which export more than Eur 25,000/year (Eur 50,000/year), and the union of both groups integrate the group of all new exporters.

Control variables are required because besides the independent variable (export status) there are other factors which systematically affect the dependent variable (labor productivity) and which must be controlled for. For instance, wage per worker can be expected to be positively correlated with productivity given that highly productive firms hire highly productive workers who are paid higher salaries. To obtain the real effect of exports on productivity, the effect of wage on productivity must be identified and isolated so the result only reflects the contribution of exports on productivity. Therefore, variables such as wage must be controlled for. Deciding on the list of proper control variables is not always straightforward and using different controls can lead to different conclusions about a causal relationship (Wooldridge, 2008). Consequently, the control variables included in the model are those most frequently employed in the NNTT literature to study the SS effect[11]:

- Wage. The firm wage is calculated as the yearly total labor cost per employee in euros, which includes all salaries, benefits and compensations paid by the firm, divided by the

[11] Another common control variable employed by the NNTT is firm size, measured as the average number of employees per year (Bernard and Jensen, 1999; Castellani, 2002; Greenaway et al., 2005; Fariñas and Martín, 2007; Minondo, 2014; Vu et al., 2016). However, after several combinations with other control variables, the control variable size proved to be non-significant and it also reduced the goodness-of-fit of the model, so it was not included as a control variable.

average number of workers in the year. Higher wages might be a proxy for higher value added or higher sales margins and it entails a higher productivity in the form of lower production costs or a higher sales price. Wage is included in the model in its logarithmic form (Castellani, 2002; Arnold and Husinger, 2005; Aw et al., 2007; ISGEP, 2008; Ito and Lechevalier, 2010; Máñez et al., 2015; Yun, 2018).

- Age. The firm age is computed as the difference between the year *t* and the birth-year reported by the firm. Age equals 1 the year the company is born. All observations where the company does not report a birth year or reports a birth year younger than the sample year are discarded. If the company reports more than one birth year, the older year is selected. This might happen in case of misreporting or a merger with an older firm. Age is an indicator of survival and for a firm to survive it must have a competitive advantage in the market, linking age to productivity. In addition, age can be associated with a more advanced position down the learning curve. In both ways (competitive advantage or learning curve) age directly affects productivity. Age is expressed in a quadratic form since it is expected that as the firm becomes older the effect on productivity decreases. As a result, it does not have a linear relationship with labor productivity (Clerides et al., 1998; Siba and Gebreeyesus, 2017). Age is included in the model in its logarithmic form (Hallward et al., 2002; Alvarez and López, 2005; Blanes et al., 2008; Haidar, 2012; Vu et al., 2016; Njikam, 2017).
- Capital. The control variable capital is defined as the annual value of tangible fixed assets per employee in euros. Tangible fixed assets include technical facilities, machinery, tooling, furniture, computer equipment, transport equipment and other tangible fixed assets, but they do not include land and buildings. A higher productive capital stock per employee is associated with higher levels of productivity as workers are in disposal of better means of production, with a positive relationship between capital per worker and productivity. The value of the tangible fixed assets is recorded in the database from the year 1991 onwards. Capital is included in the model in its logarithmic form (Baldwin and Gu, 2003; Fariñas and Martín, 2007; Ito and Lechevalier, 2010; Cruz et al., 2017; Newman et al., 2017; Yun, 2018).
- Foreign. Dummy variable indicating if there is foreign ownership in the firm's equity, with a value of 1 if the foreign ownership is higher than 0 percent of the firm's equity

and a value of 0 otherwise. Foreign ownership might entail technology transfers in the form of licenses, blueprints, experts and machinery made by the foreign investor to the local firm, all positively associated with productivity (Castellani, 2002; Hallward et al., 2002; Alvarez and López, 2005; Barboni et al., 2012; Bravo et al., 2014; Máñez et al., 2015; Njikam, 2017).

- Innovation. Innovation is a dummy variable which indicates if the firm is more innovative than the average firm in the same industrial sector *j*. The dummy variable takes value 1 if the firm *i* is more innovative than the average firm in the same industrial sector *j* in year *t* and a value of 0 otherwise. Innovation per firm is calculated as R&D intensity, which is the sum of all the R&D expenditures of a company divided by its sales per year. A higher R&D intensity than the industry average might involve a higher absorptive capacity on new knowledge, better manufacturing processes and higher value added for the firm, with a direct impact on productivity (Castellani, 2002; Arnold and Husinger, 2005; Aw et al., 2007; Blanes et al., 2008; Bravo et al., 2014; Máñez et al., 2015; Njikam, 2017).
- Year & industry. Year includes all the years of the sampled period 1990-2015. Every year is different for the manufacturing sector as there are annual macroeconomic factors at a country level such as monetary policies (exchange rate depreciation/devaluation), fiscal policies (tax cuts/increases) and labor policies (labor incentives) which directly affect all manufacturing firm's productivity. Thus, year-to-year variations must be controlled for (Bernard and Wagner, 1997; Aw et al., 2000; Isgut, 2001; Girma et al., 2004; Serti and Tomasi, 2008; Minondo, 2014; Cruz et al., 2017). In addition to this, there are middle and high technology industrial sectors, such as the machinery and transport equipment industries, with higher productivity than other low technology industrial sectors such as the meat products and beverage industries. Belonging to a middle or to a high technology sector affects the firm productivity and so it must be accounted for (Bernard and Jensen, 1999; Isgut, 2001; Baldwin and Gu, 2003; Fariñas and Martín, 2007; ISGEP, 2008; Haidar, 2012; Temouri et al., 2013; Newman et al., 2017). The combination of both factor variables (year and industry) allows to capture the potential differential effect of the economic cycle on each industry (Correa and Doménech, 2012).

Once the aforementioned variables are included, the proposed research model turns as follows:

$$\textbf{(7)}\ \log P_{it-1} = \alpha + ß_1\, Status_{it} + ß_2 \log Wage_{it-1} + ß_3 \log Age_{it-1} + ß_4 \log Age_{it-1}{}^2 + ß_5 \log Capital_{it-1} + ß_6\, Foreign_{it-1} + ß_7\, Innovation_{it-1} + \sum ß_8\, Year_t\, Industry_j + e_{it}$$

Table a12 (in annexes) includes common descriptive statistics for the variables incorporated in the research model. It also includes extra variables such as: marketing intensity, sales per hour worked, value added per hour worked and wage per hour worked, which are employed by the robustness checks of section 6.3.

5. Methodology and data

As reported by the seminal meta-analysis of dozens of NNTT papers elaborated by Wagner (2012), the most common approach to test the SS effect within the NNTT literature is to employ a panel of longitudinal data for multiple firms to study differences in productivity between new exporters and non-exporters before exporting takes place.

As labor productivity is a continuous variable, a pooled linear ordinary least squares (OLS) regression can be run. OLS is a method for estimating the unknown parameters in a linear regression model with the goal of minimizing the sum of the squares of the differences between the observed values of the dependent variable (firm labor productivity as measured in the sample) and the predicted values by the linear function.

The control variables employed in the empirical model are part of the observed heterogeneity on productivity among firms, as they can be detected and their incidence on productivity can be measured. But it is highly likely that there are unobserved firm characteristics such as product attributes such as quality which affects the decision to export by the firm. Since these characteristics are potentially permanent, highly serially correlated and unobserved by the econometrician, they will cause to estimate inefficiently the effect of the SS effect (Bernard and Jensen, 2004b).

It is possible to select between fixed effects or random effects to introduce the unobserved firm heterogeneity in the model. The use of random effects requires that the unobserved firm effects are uncorrelated with the independent variables. However, this assumption is likely violated in the export decision model as firm characteristics such as capital intensity, innovation and wage are prone to be correlated with product attributes and other potential unobserved firm characteristics such as managerial ability and technology. Since unobserved firm characteristics are likely correlated with the independent variables, fixed effects are selected to model the unobserved firm heterogeneity (Bernard and Jensen, 2004b).

As many independent variables are used in this multiple regression model, the variance inflation factors (VIF) are used to check the existence of multicollinearity before employing the OLS regression in order to avoid possible undesired influences in the results obtained that might be caused by the correlation between independent variables (Zhang, 2016). When multicollinearity exists the standard errors of the estimated coefficients (their variances) are inflated. The VIF is the factor by which the variance of an estimated regression coefficient is inflated by the existence of correlation among the independent variables in a multiple regression model. As a rule of thumb, if VIF has value 1 it means that there is no correlation among the independent variable studied and the remaining independent variables, if VIF exceeds 5 it warrants further investigation and if VIF exceeds 10 there are signs of serious multicollinearity which require correction measures (O'Brien, 2007). For this regression, the VIF values obtained range from 2.00 to 3.00, which confirms that the correlation among the different independent variables is low.

After testing for groupwise heteroskedasticity (modified Wald test) and serial correlation (Wooldridge test) the results obtained lead to reject the null hypothesis of homoscedasticity (or constant variance) and no serial correlation in the empirical model which might cause estimation problems. By applying robust standard errors, the OLS estimators consistently estimate the true standard errors even for samples that suffer from heteroskedasticity and autocorrelation, avoiding a loss in efficiency in the estimators and obtaining better inferences (Stock and Watson, 2015).

In firm-level databases, such as the ESEE dataset employed, often the values for some variables for some firms are extremely low or extremely high compared to the mean values of the sample, also known as outliers. These extreme values can be attributed to idiosyncratic events, for instance the output of a shipyard that produces a ship over several years and reports the sales in the year the ship is completed and delivered. Besides, outliers can be the result of reporting errors, such as when firms commit mistakes filling the survey data, although they can also be caused by the diverging behavior of a firm (Wagner, 2012). The estimates of the SS effect, the productivity difference between new exporters and non-exporters before entry into exports takes place, can be greatly influenced by a minority of firms with extremely high or low values (outliers). Nevertheless, robust estimators for panel data with fixed effects has been proposed by Bramati and Croux (2007) to tackle both unobserved firm heterogeneity and the presence of outliers in the sample, due to outliers can have a large influence on the estimated parameters when using the OLS technique (Temouri and Wagner, 2013; Wagner, 2015).

The estimated coefficient $ß_1$ expressed as 100 x (exp($ß_1$)-1) is the SS effect expressed in percentage and it shows the average percentage labor productivity difference between new micro-exporters and non-exporters before entry into exports, after controlling for the characteristics included in the vector *Control*, the effect of outliers and the unobserved heterogeneity through the fixed effects (ISGEP, 2008).

To alleviate the large-firm overrepresentation problem that biases firm-level national statistical databases, the analysis focuses on the specific data concerning new micro-exporters and non-exporters, including and excluding quitters. By focusing the analysis on micro-exporters' data it can be expected that the results obtained conform better to their specific reality, supported by an export entry conceptual framework which allows to explain why firm heterogeneity crystalizes into different export entry patterns that render different results such as the existence or not of the SS effect, setting apart new micro-exporters from other new exporters. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded.

The data employed comes from the *Encuesta sobre Estrategias Empresariales* (ESEE), the Survey on Business Strategies, that covers Spanish manufacturing firms for the period 1990 to 2015, described in greater detail in Chapter I, section 5. This is the most frequently employed Spanish firm-level database within the NNTT to test the SS effect. Empirical papers on the Spanish economy mentioned previously in this chapter such as Delgado et al., 2002; Fariñas and Martín, 2007; Blanes et al., 2008; ISGEP, 2008; and Máñez et al., 2009 use the ESEE and also others such as Avella and García (2010) who report that small and medium enterprises (SME) from the manufacturing sector for the period 1990-2002 are more productive, measured as value added per employee, than non-exporting firms before starting to export and also that future exporters improve their labor productivity levels more than non-exporters during the previous three year to initiate the export activity. Cassiman et al., (2010), who, with a sample of SMEs from the manufacturing sector for the period 1990-1998, obtain that product innovation increases productivity, which induces small non-exporting firms to enter the export market, finding indirect evidence in favor of the SS effect. And Máñez et al., (2015), who employ for testing a sample of Spanish manufacturing firms from 1990 to 2009, to obtain that most productive firms self-select into exports and also that exporting and investing in R&D become complementary interrelated activities, where firms find innovation and exporting more efficient when they are performed combined, than when they are performed individually.

The ESEE includes 20 two-digit Spanish manufacturing industrial sectors j defined by the *Clasificación Nacional de Actividades Económicas* (CNAE), the National Classification of Economic Activities, following its latest update in 2009. Following the standard procedure within the NNTT, monetary values in euros have been deflated by the *Índice de Precios Industriales* (IPRI), the Industrial Price Index for the Spanish manufacturing sector, base year 2010, to be expressed in constant values and eliminate biases due to inflation. This deflation index includes different index numbers per year for each of the 20 industries j to account for differences in the inflation rate among industrial sectors.

The ESEE database contains an unbalanced panel of 183 new micro-exporters which do not export more than Eur 25,000/year, 290 new micro-exporters which do not export more than Eur 50,000/year, 944 quitters and an average of 569 non-exporters per year (quitters excluded) as presented in table 11. Due to the fact that new micro-exporters are defined as firms which do not export in year $t-1$ and start to export in year t, the first year of the sample 1990 does not contain any new micro-exporter as it is not possible to know their previous export status in 1989. Therefore, as per table 11, in the sample the first $t-1$ year is 1990 and the first t year is 1991, creating the first wave of new micro-exporters in the year 1991.

Table 11. Number of new micro-exporters, non-exporters and quitters sampled by the ESEE database per year, period 1990-2015

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
New micro-exporters <= €25,000/year	-	10	9	6	9	8	3	8	8
New micro-exporters <= €50,000/year	-	18	16	12	16	14	5	12	13
Quitters	-	66	43	59	58	34	34	39	50
Non-exporters (quitters excluded)	-	871	814	739	716	643	568	534	587
Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
New micro-exporters <= €25,000/year	6	5	7	6	3	4	3	8	10
New micro-exporters <= € 50,000/year	12	10	10	10	6	5	5	10	17
Quitters	45	30	39	42	45	11	14	35	45
Non-exporters (quitters excluded)	533	551	542	534	449	478	424	571	676
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	
New micro-exporters <= €25,000/year	7	4	11	11	11	9	7	10	
New micro-exporters <= €50,000/year	10	8	16	15	14	12	10	14	
Quitters	36	45	42	35	22	39	21	15	
Non-exporters (quitters excluded)	637	575	579	552	453	453	396	350	

Source: Own elaboration with unbalanced panel data from the ESEE database for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

6. Results

6.1. Descriptive analysis

A descriptive analysis of the ESEE firm-level data shows that new micro-exporters, on average, tend to use export entry strategies that minimize the export entry cost more often than the rest of new exporters, as predicted by the conceptual framework. First of all, regarding the export decision on what foreign market/s to enter, new micro-exporters tend to employ gravitational markets more likely than other new exporters. Table 12 shows that new micro-exporters start to export close to 75 percent of their exports to gravitational EU countries, while other new exporters export 61 percent. However, new micro-exporters start by exporting to non-gravitational markets belonging to the Organization for Economic Cooperation and Development (OECD) such as Australia, Japan, South Korea, Turkey and US about 8 percent of their total exports, whereas other new exporters export to OECD countries up to 25 percent. The category other exports includes all the countries not contained within the EU and the OECD, which can be gravitational as Morocco and non-gravitational like India and South Africa. Consequently, not much can be inferred from this export destination category. More interestingly, for large new exporters the data shows that the smaller the volume exported, the larger the proportion of exports to the EU. This supports the idea that there is a continuum of heterogeneous new exporters which employ more often gravitational export entry strategies when their productivity and exported volumes are low. Overall, the ESEE data is close to the aggregate national pattern since in 2015 the total volume of Spanish exports to the EU reached 64.7 percent as reported by the *Instituto Español de Comercio Exterior* (ICEX, 2019).

The ESEE also offers disaggregated data for the category other exports subdivided into Latin-American countries and the rest of the countries. However, since this data is only available for the years 2002, 2006, 2010 and 2014, it is rather insufficient to provide reliable statistics and, therefore, they are not included in table 12. At any rate, it seems to be aligned with the export entry framework where micro-exporters start by exporting proportionally more to Latin-America than new all/large exporters.

Table 12. Average exported percentage by export destination area for different export status groups of new exporters, years from 1990 to 2014

	Export status				
Export market area	**New micro-exporters <= €25,000**	**New micro-exporters <= €50,000**	**New all exporters**	**New large exporters >€25,000**	**New large exporters >€50,000**
EU exports $_t$ (%)	76.23%	73.47%	61.41%	61.40%	61.39%
OECD exports $_t$ (%)	7.02%	8.69%	24.95%	24.96%	24.97%
Other exports $_t$ (%)	16.75%	17.84%	13.64%	13.64%	13.64%

Source: Own elaboration with unbalanced panel data from the ESEE database for the years 1990, 1994, 1998, 2002, 2006, 2010 and 2014. The percentages have been weighted by the volume exported per firm. New all exporters are all those firms that do not export in year *t-1* and report positive exports in year *t*. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Secondly, on the export decision on which product/s to exports, new micro-exporters develop new products less likely than any other new exporters before starting to export, as shown in table 13. Defining product innovation as the activity of developing completely new products or adding important modifications so that the product can be considered different from its previous design, as depicted in table 13, only 13 percent of all new micro-exporters respond positively when asked if they develop a product innovation the previous year to start exporting (*t-1*) or the year they start exporting (*t*) (should the export activity start in the last months of the year). This ratio for new micro-exporters is close to the 10 percent product innovation rate reported by non-exporting firms and far from the 23 percent rate reported by large new exporters. These results suggest that new micro-exporters start by exporting existing products more often than other new exporters and that they are more likely to use an existing product export entry strategy.

Table 13. Average new product development percentage per year for different export status groups of new exporters and non-exporters, period 1990-2015

Product development	Export status						
	New micro-exporters <= €25,000	New micro-exporters <= €50,000	Non-exporters (quitters excluded)	All non-exporters (quitters included)	New all exporters	New large exporters >€25,000	New large exporters >€50,000
New product $_t$	13.12%	12.07%	9.53%	10.16%	20.90%	22.23%	23.57%
New product $_{t-1}$	13.12%	12.76%	9.53%	8.75%	18.10%	18.97%	19.73%

Source: Own elaboration with unbalanced panel data from the ESEE database for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

And thirdly, on the matter of how to enter each market by type of product (distribution channel), as shown in table 14, new micro-exporters (almost) do not report to export by a parent company installed abroad or by collective means (association of exporters, cooperative of exporters and sectoral export agreement). Nevertheless, new large exporters inform that they use these direct export channels structures more often, since about 4 to 7 percent report starting to export using these channels. The data is consistent with the export entry conceptual framework since foreign firms do not invest in micro-exporters as a sourcing platform and new micro-exporters do not invest their time and resources to enter into collective export agreements to export small amounts for a short period of time. When new micro-exporters are asked if they use other direct export entry modes such as their own sales network, a branch, a delegation or a subsidiary only 28 percent answer positively, while this ratio increases to 40 percent when new large exporters are asked.

In addition, as shown in table 14, when new exporters are asked if they employ indirect channels to start exporting, around 20 percent indicate that they use a Spanish based intermediary, with not much difference between new micro-exporters and new large exporters. However, when they are asked for even more indirect ways of exporting the difference becomes important since almost half new micro-exporters answer that they export via international distributors or serve a direct order from the foreign client, while about 30 percent of new large exporters mark this answer, reporting also to export thanks to contacts made in trade fairs.

Table 14. Average percentage of export channel usage for different export status groups, years from 1990 to 2014

	Export status				
Export channel	**New micro-exporters <= €25,000**	**New micro-exporters <= €50,000**	**New all exporters**	**New large exporters >€25,000**	**New large exporters >€50,000**
Parent company abroad $_t$	0.00%	1.39%	6.01%	7.20%	7.58%
Collective exports $_t$	0.00%	0.00%	4.24%	5.09%	5.69%
Direct exports $_t$	29.79%	26.39%	37.81%	39.41%	41.71%
Spanish intermediary $_t$	19.15%	20.83%	21.91%	22.46%	22.28%
Foreign intermediary/ customer $_t$	48.94%	48.61%	34.63%	31.78%	29.86%

Source: Own elaboration with unbalanced panel data from the ESEE database for the years 1990, 1994, 1998, 2002, 2006, 2010 and 2014. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

The data in the ESEE is aligned with the hypothesis that new micro-exporters employ more often export entry strategies that minimize the export entry cost such as accessing gravitational markets, with existing products, via intermediaries in order to reduce the costs and risks associated with entry into exports to counter their lack of resources and low productivity levels. Nevertheless, these results must be interpreted with caution because, in many cases, the information is not reported in the required disaggregate categories and the volume of data is limited.

A descriptive analysis of twelve firm performance characteristics plus age, frequently employed by the NNTT literature such as in Bernard and Jensen, 1995; Bernard and Wagner, 1997; Girma et al., 2004; Arnold and Hussinger, 2005; Greenaway et al., 2005; Hahn, 2005; Fariñas and Martín, 2007; Ito and Lechevalier, 2010; Yang and Mallick, 2010; Temouri et al., 2013; and Njikam, 2017, supports the assumption made in the conceptual framework which states that new micro-exporters do not have better performance characteristics and, more specifically, a higher productivity level than non-exporters before starting to export as a consequence of the SS effect. The low productivity levels of new micro-exporters before starting to export are revealed by the low values of labor productivity, measured as: sales per worker, value added per worker, sales per hour worked and value added per hour worked in year *t-1*, compared to non-exporters and to new large exporters. And the lack of internal resources of new micro-exporters is shown by their small size, measured as sales and employment, the low wages paid, the inferior capital intensity and the lower investment in marketing activities.

Table 15 includes the average value for each performance characteristic from the unbalanced panel data for all new exporters and non-exporters contained in the ESEE for the entire period 1990 to 2015, both years included, deflated by the IPRI.

As predicted by the conceptual framework, table 15 shows that new micro-exporters, before starting to export, do not have better performance characteristics than non-exporters as they are smaller in terms of employment and sales, less capital intensive, less productive, pay lower wages, they have less foreign ownership and invest less in marketing than non-exporters. On average, new micro-exporters employ twice less employees, sale three times less, pay wages 10 percent lower, have 20 percent less labor productivity and have eight times less foreign investment in their capital than non-exporting firms. They are also two years younger. Interestingly new micro-exporters only outperform non-exporters in R&D intensity, consistent with the higher product development rate reported in table 13. When new micro-exporters are compared to new large exporters the performance differences before starting to export grow (even) bigger. New micro-exporters, on average, employ four times less employees, sale seven times less, have four times less R&D intensity and twice less marketing intensity, have 50 percent less labor productivity and capital intensity, pay 20 percent less to their workers and they have 30 times less foreign investment in their capital than new large exporters the previous year to start exporting. Besides, they are five years younger. It seems that new micro-exporters do not have better performance characteristics than non-exporters before starting to export and much less than new large exporters.

Table 15. Average performance characteristics in year *t-1* for different export status groups for the period 1990-2015 (constant values in euros)

Firm performance characteristic	Export status						
	New micro-exporters <= €25,000	New micro-exporters <= €50,000	Non-exporters (quitters excluded)	Non-exporters	New all exporters	New large exporters >€25,000	New large exporters >€50,000
Employees (size) $_{t-1}$	29	30	55	58	109	123	133
R&D/sales $_{t-1}$	0.44%	0.34%	0.25%	0.27%	1.63%	1.84%	2.03%
Marketing/sales $_{t-1}$	0.67%	0.65%	0.68%	0.71%	1.54%	1.69%	1.81%
Capital/worker $_{t-1}$	43,104	42,249	53,890	54,484	60,507	63,490	66,013
Sales $_{t-1}$	3.66e+06	3.67e+06	9.74e+06	1.07e+07	2.31e+07	2.65e+07	2.90e+07
Sales/worker $_{t-1}$	84,461	100,355	105,975	108,236	145,851	156,480	159,739
Sales/hour $_{t-1}$	48.01	57.48	60.14	61.54	82.91	88.98	90.60
Wage/worker $_{t-1}$	23,928	23,760	24,955	25,160	27,940	28,630	29,210
Wage/hour $_{t-1}$	13.72	13.50	14.26	14.40	16.05	16.46	16.82
VA/worker $_{t-1}$	31,736	33,697	36,206	36,629	43,892	45,983	47,004
VA/hour $_{t-1}$	17.98	18.91	20.50	20.77	24.98	26.19	26.81
Foreign $_{t-1}$	0.26%	0.34%	2.36%	2.72%	7.94%	9.27%	10.24%
Age $_{t-1}$	20	20	22	22	24	25	25
No. Firms	183	290	14,230	15,186	1,249	1,066	959

Source: Own elaboration with unbalanced panel data from the ESEE database for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. No. firms includes the maximum number of unique firms per group in the sample.

Performing a t-test to compare the difference in the means for different export status groups, the results are revealing. From the twelve performance indicators only the R&D/sales mean in *t-1* for all new exporters and new large exporters does not differ statistically from non-exporters, including or excluding quitters. Clearly new exporters, on average, have better performance characteristics than non-exporters before starting to export. However, comparing the group of new micro-exporters to non-exporters, these nonsignificant differences in the mean values extend to marketing intensity, the wages paid and all four indicators of labor productivity in year *t-1*. On average, new micro-exporters have similar performance characteristics than non-exporters, if not lower.

It is interesting to appreciate how the performance characteristics increase for each group of new exporters as, moving from left to right in table 15, the export status goes from new micro-exporters to non-exporters, to all new exporters, to new large exporters. The firm-level data contained in the ESEE for the period 1990 to 2015 is in line with the hypothesis that new micro-exporters have no better performance characteristics than non-exporters before starting to export. More specifically, new micro-exporters have no better labor productivity measured as sales per worker, value added per worker, sales per hour worked and value added per hour worked than non-exporters, prior to start exporting. These results support the idea that new micro-exporters do not experience the SS effect given the export entry strategies employed. However, there is a great deal of heterogeneity among industrial sectors and firms, so a thorough econometric analysis is required to identify and isolate all other factors which might be polluting the comparison between new micro-exporters and non-exporters.

6.2. Empirical results

With an unbalanced panel data obtained from the ESEE database for the period 1990-2015, running a robust regression with fixed effects and sales per worker as the dependent variable, the results obtained are included in table 16. The variable status represents the labor productivity difference between new micro-exporters and non-exporters the year before starting to export (*t-1*). This variable is negative and statistically significant for the group of new micro-exporters which do not export more than Eur 25,000/year compared to the group of non-exporters (excluding quitters) and to the group of all non-exporters (including quitters). For new micro-exporters which do not export more than Eur 50,000/year the variable status is positive but not significant when compared to non-exporters (quitters excluded) and becomes negative but not statistically significant when compared to all non-exporters (quitters included).

These results in table 16 show that new micro-exporters do not have higher labor productivity levels, measured as sales per worker, than non-exporting firms before starting to export, supporting the hypothesis that new micro-exporters do not experience the SS effect into the export market. Furthermore, the negative and significant value of the variable status points in the opposite direction, new micro-exporters might be less productive than the average domestic firm before starting to export.

Table 16. OLS robust regression with fixed effects for the SS effect, dependent variable sales per worker

Variable	Quitters excluded	Quitters included	Quitters excluded	Quitters included
	New micro-exporters <= €25,000	New micro-exporters <= €25,000	New micro-exporters <= €50,000	New micro-exporters <= €50,000
Status $_t$	-.038*	-.042**	.003	-.005
	(-1.67)	(-1.99)	(0.18)	(-0.31)
Wage $_{t-1}$ **(log)**	.562***	.566***	.561***	.565***
	(19.39)	(20.39)	(19.42)	(20.41)
Age $_{t-1}$ **(log)**	.308***	.287***	.308***	.286***
	(3.38)	(3.31)	(3.39)	(3.32)
Age $_{t-1}$ **(log)**^{2}	-.119***	-.111***	-.118***	-.110***
	(-3.78)	(-3.66)	(-3.76)	(-3.65)
Capital $_{t-1}$ **(log)**	.067***	.067***	.068***	.067***
	(6.30)	(6.42)	(6.40)	(6.50)
Foreign $_{t-1}$	.053	.042	.051	.040
	(0.92)	(0.80)	(0.87)	(0.76)
Innovation $_{t-1}$	.051	.068**	.051	.068**
	(1.47)	(2.21)	(1.47)	(2.21)
Constant	4.779***	5.005***	4.974***	4.697***
	(9.65)	(13.16)	(11.00)	(8.99)
Year and industry effect	Included	Included	Included	Included
N	2,126	2,267	2,143	2,275
Observations	13,271	14,154	13,369	14,252
Adj. R squared	0.9048	0.8999	0.9047	0.9000

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

The different values obtained for the variable status for the group of all non-exporters (quitters included) and the group of non-exporters (quitters excluded) can be explained by the fact that exiting firms from the export market have been found to have higher performance attributes than continuous non-exporters, specifically higher productivity levels (Aw et al., 2000; Bernard and Jensen, 2004a; Yasar et al., 2006). Therefore, if quitters are included within the group of non-exporters, the average productivity level for this group of non-exporting firms rises, increasing the ex-ante productivity gap between new micro-exporters and all non-exporters embodied in the variable status.

The control variables age, capital intensity and wage, as expected and reported by the NNTT literature, have a positive and statistically significant effect, supporting the proposition that firms which are older, more capital intensive and pay better wages to their employees have higher labor productivity levels. These control variables, as mentioned earlier, have a positive relationship to productivity as higher wages are associated with better skilled and more productive human resources, age is associated with a competitive advantage or a more advanced position down the learning curve, and capital intensity is associated with ample internal resources and better technology. As per table 16, age has an increasingly increasing positive effect on productivity during the first 20 years of activity and a decreasingly increasing effect on productivity until the firm reaches a severe longevity, above 385 years old. From that point forward, age has a negative effect on productivity. Figure a5 (in annexes) describes graphically the effect of age on productivity when productivity is measured as sales per worker.

The control variables foreign ownership and innovation, as expected, are also positive, but in most cases not statistically significant. This might be explained by the low levels of foreign ownership and R&D intensity registered for new micro-exporters and non-exporters as shown in table 15. Therefore, even if foreign investment and innovation intensity have a positive effect on firm´s labor productivity given the low levels listed, these variables do not have a significant impact on productivity.

The combined factor variable year and industry is relevant after performing a joint significance test and the goodness-of-fit of the linear model, measured as adjusted R-squared, increases for all tests when the combined factor variable is included. Moreover, the goodness-of-fit is higher for all tests when the combined factor variable is included versus including both factor variables (year and industry) but not combined.

With the same unbalanced panel data for the period 1990-2015, running a robust regression with fixed effects and value added per worker as the dependent variable, the results obtained are included in table 17 where the variable status becomes negative and statistically non-significant for new micro-exporters that do not export more than Eur 25,000/year. For new micro-exporters which export no more than Eur 50,000/year the independent variable status is again positive when compared to the group of all non-exporters and, this time, also when compared to the group of non-exporters (quitters excluded), but still not significant. These results reassert the hypothesis that new micro-exporters do not enjoy higher productivity levels than non-exporters before starting to export. More specifically, entry into exports is not associated with higher levels of ex-ante labor productivity, contradicting the existence of the SS effect for new micro-exporters.

Table 17. OLS robust regression with fixed effects for the SS effect, dependent variable value added per worker

Variable	**Quitters excluded**	**Quitters included**	**Quitters excluded**	**Quitters included**
	New micro-exporters <= €25,000	**New micro-exporters <= €25,000**	**New micro-exporters <= €50,000**	**New micro-exporters <= €50,000**
Status $_t$	-.021	-.030	.025	.006
	(-0.66)	(-1.06)	(0.92)	(0.24)
Wage $_{t-1}$ (log)	.727***	.723***	.726***	.723***
	(20.57)	(20.97)	(20.62)	(21.03)
Age $_{t-1}$ (log)	.244*	.196	.247**	.200*
	(1.95)	(1.64)	(1.98)	(1.68)
Age $_{t-1}$ (log)^2	-.067	-.051	-.067	-.052
	(-1.56)	(-1.25)	(-1.58)	(-1.28)
Capital $_{t-1}$ (log)	.037***	.043***	.038***	.044***
	(2.91)	(3.07)	(2.99)	(3.16)
Foreign $_{t-1}$	-.060	-.028	-.062	-.029
	(-1.21)	(-0.51)	(-1.25)	(-0.53)
Innovation $_{t-1}$	-.029	-.015	-.028	-.015
	(-0.94)	(-0.47)	(-0.89)	(-0.43)
Constant	2.213***	2.560***	2.220***	1.883***
	(5.74)	(6.47)	(5.75)	(4.09)
Year and industry effect	Included	Included	Included	Included
N	2,112	2,252	2,129	2,260
Observations	13,050	13,902	13,146	13,998
Adj. R squared	0.6765	0.6732	0.6763	0.6735

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

The control variables age, capital intensity and wage, as expected, have a positive and statistically significant effect, supporting that firms which are older, more capital intensive and pay better wages to their employees have higher labor productivity levels. Again, age has an increasingly increasing positive effect on productivity the first 66 to 86 years of activity and a decreasingly increasing effect on productivity until the firm reaches an extreme longevity, more than 1,000 years old. From that point forward, age has a negative effect on productivity. Figure a6 (in annexes) describes graphically the effect of age on productivity when productivity is measured as value added per worker.

Regarding the control variables foreign ownership and innovation intensity, when the dependent variable is value added per worker, they remain not statistically significant given the low levels listed for new micro-exporters and non-exporters as reported in table 15, but become negative. These value differences for both control variables when labor productivity is measured as sales per worker or value added per worker, might be explained if foreign ownership and innovation intensity increase the volume of sales but reduce the sales margin. For instance, a new product innovation might increase the total volume of sales with the same number of employees, increasing the average sales per worker. However, if the firm sells in a very competitive market, it might not increase its markups, and selling more of a more costly product at the same price reduces the sales margin and the value added per worker.

The combined factor variable year and industry is relevant after performing a joint significance test and the goodness-of-fit of the linear model, measured as adjusted R-squared, increases for all tests when the combined factor variable is included. Besides, the goodness-of-fit is higher for all tests when the combined factor variable is included versus including both factor variables (year and industry) but not combined.

Table a13 and table a14 (in annexes) contain the correlation matrix for the variables included in the research model. It is worth mentioning that few variables show a high degree or correlation (higher than 0.500). Among them is age and age squared (0.9) which is not surprising, labor productivity and wage (0.6), labor productivity and capital per worker (0.5) and wage and capital per worker (0.5) when labor productivity is calculated as sales per worker and value added per worker for new micro-exporters which do not export more than Eur 50,000/year versus all non-exporters (quitters included).

To sum up, the results obtained from the descriptive statistics analysis and from the regression tests are in line with the assumption that new micro-exporters are no more productive than non-exporters before starting to export, supporting the hypothesis that new micro-exporters do not self-select into the export market. These results are reaffirmed by the graphical comparison of the labor productivity distribution functions for both groups of new micro-exporters and non-exporters as shown in figure a7 and figure a8 (in annexes) following the formulation of Delgado et al., (2002) in addendum a2 (in annexes).

6.3. Robustness checks

In order to check the robustness of the results, the regression analysis is repeated with three different robustness checks.

The first robustness check replaces the innovation control variable for a marketing control variable where marketing is a dummy variable which indicates if the firm is more marketing intensive than the average firm in the same industrial sector *j*. Marketing intensity per firm is calculated as the sum of all the marketing expenses of a company divided by its sales per year. These marketing costs include advertising, promotion and public relations. The dummy variable takes value 1 if the firm *i* is more marketing intensive than the average firm in the same industry sector *j* in year *t-1* and a value of 0 otherwise. A higher marketing intensity than the industry average helps the firm to differentiate its products and build a strong reputation around its brand, which increases the company negotiation power with customers, with a direct impact on productivity (García et al., 2012). The research model can be rewritten as:

(8) $$\log P_{it-1} = a + ß_1\,\text{Status}_{it} + ß_2 \log \text{Wage}_{it-1} + ß_3 \log \text{Age}_{it-1} + ß_4 \log \text{Age}_{it-1}{}^2 + ß_5 \log \text{Capital}_{it-1} + ß_6\,\text{Foreign}_{it-1} + ß_7\,\text{Marketing}_{it-1} + \sum ß_8\,\text{Year}_t\,\text{Industry}_j + e_{it}$$

The previous results are highly consistent to this robustness check. As shown in table a15 and table a16 (in annexes) the variables and the constant do not experience any relevant changes (higher than 1 percent) in their estimators or their significance levels, except for the control variable marketing which is replacing innovation. When the dependent variable is labor productivity measured as sales per worker, the variable marketing is positive as expected and reported by the NNTT literature and statistically significant for both groups of new micro-exporters. And, when the dependent variable is labor productivity measured as value added per worker, marketing is positive, as expected, but it becomes not statistically significant. This difference in the value of the control variable marketing when labor productivity is measured as sales per worker or value added per worker might be explained if marketing intensity significantly increases sales, but not markups for the group of firms examined. More importantly, the explanatory variable status remains non-significant supporting the hypothesis that new micro-exporters do not have higher levels of productivity than non-exporting firms before starting to export, contradicting the existence of a SS effect on new micro-exporters.

The second robustness check redefines the dependent variable labor productivity that is calculated as sales per worker and value added per worker, as sales per hour worked and value added per hour worked. These new variables are calculated as sales or value added divided by the yearly effective hours of work (Fariñas and Martín, 2007). Yearly effective hours of work are calculated as the sum of the normal work hours plus the overtime minus the non-worked hours.

Given than the average employment per year and the yearly effective hours of work are highly correlated it is not surprising that previous results remain highly robust. As shown in table a17 and table a18, when the dependent variable is sales per hour worked the control variable wage reduces its effect on productivity about 2 to 3 percent and the constant becomes negative for both groups of new micro-exporters. When the dependent variable is value added per hour worked again the control variable wage reduces its effect on productivity about 2 to 3 percent and the constant becomes negative for both groups of new micro-exporters. This difference in the variable wage might be explained by the fact that the unit of measurement of labor productivity is no longer the employee but the hours worked, and the relationship between the control variable wage per worker and labor productivity, which is now measured by hours and not workers, becomes less strong. In all cases, the explanatory variable status remains non-significant and when statistically significant becomes negative, supporting the hypothesis that new micro-exporters do not have higher levels of productivity than non-exporters before starting to export. At best the labor productivity of new micro-exporters is similar to non-exporters, when it is not lower, giving support to the idea that new micro-exporters are not subject to a SS effect into exports.

The third robustness check replaces the control variable wage calculated as the yearly total labor cost per employee in euros which includes all salaries, benefits and compensations paid by the firm divided by the average number of workers during the year, by a variable wage per hour worked calculated as the yearly total labor cost in euros divided by the yearly effective hours of work as calculated in Fariñas and Martín (2007). As shown in table a19 and table a20, when the dependent variable is sales per worker, the only relevant change is in the control variable wage per hour worked which reduces its effect on labor productivity about 10 percent compared to the control variable wage per worker. When the dependent variable is value added per worker, the only relevant change is also in the control variable wage per hour worked which again reduces its effect on labor productivity about 10 percent. In both cases, changing the control variable wage per worker for wage per hour worked slightly reduces the goodness-of-fit of the model. This might be explained if the relationship between the independent variable labor productivity measured by sales or value added per worker and the control variable wage is stronger when the control variable is measured as total labor cost per worker compared with total labor cost per hour worked. Regarding the independent variable status, it remains non-significant, contradicting the existence of a SS effect on new micro-exporters[12].

The three robustness checks performed: i) replacing the control variable innovation intensity for marketing intensity, ii) substituting the dependent variable sales and value added per worker for sales and value added per hour worked, and iii) changing the control variable wage per worker for the control variable wage per hour worked, reaffirm the previous results obtained which validate the hypothesis that new micro-exporters are no more productive than non-exporters before starting to export and give support to the proposed export entry conceptual framework. The results show that new micro-exporters do not have higher levels of labor productivity than non-exporting firms before starting to export and do not self-select into the export market.

[12] The additional robustness check performed in Chapter I, where the control variable foreign ownership threshold is modified, has not been included in this chapter, because the results obtained are very similar to previous results given the low levels of foreign ownership reported by new micro-exporters and non-exporters. As a result, other robustness checks are prioritized.

7. Conclusions

7.1. Conclusions and limitations of the study

The NNTT literature proposes the existence of a SS effect for new exporters into exports, a mechanism whereby firms self-select themselves into the export market given the high productivity levels required to absorb the costs associated with entry into exports such as market intelligence, product adaptation, customs bureaucratic procedures and the likes (Melitz, 2003). The high entry cost also increases export persistence as exporters have an incentive to keep on exporting in order to avoid paying again the same entry cost if they exit and reenter the international market, known as export hysteresis (Máñez et al., 2008).

Nonetheless, more recently the NNTT literature has found that many firms export tiny amounts (Eaton et al., 2011) and that countries have granular export structures (Bernard et al., 2018) with an extreme concentration of trade across few firms which coexist with a large number of firms which export very little. Chapter II proposes an export entry conceptual framework where a large group of firms with low productivity and few resources access the international market by selecting export entry strategies which not only reduce the export entry cost to a negligible level, but also severely limit the volume exported. These firms are called new micro-exporters and due to their low productivity levels and their negligible export entry costs, they are no longer subject neither to the SS effect nor to the export hysteresis. Furthermore, the hypothesis that new micro-exporters do not have higher productivity levels than non-exporters before starting to export is proposed and validated with panel data of Spanish manufacturing firms for the period 1990 to 2015, contesting the existence of a SS effect among new micro-exporters.

The absence of a SS effect for new micro-exporters can be explained by the export entry conceptual framework where firms with few internal resources and low productivity select complementary export entry strategies such as exporting an existing product, to a gravitational market, via an intermediary to reduce the export entry cost and access the international market. However, this export entry decisions reduce the volume exported to small amounts and deter export hysteresis among new micro-exporters.

The proposed export entry conceptual framework and the results on the SS effect for new micro-exporters complement the latest developments in the NNTT literature such as the new export dynamics where firms start by exporting small amounts, often exporting just one product to one country (Ruhl and Willis, 2017). By incorporating the export dynamics of new micro-exporters, which represent a majority of new exporting firms in most countries, Chapter II expands the existing international trade theory by integrating a neglected group of new exporters within the current NNTT literature.

Nevertheless, the performed analysis of the SS effect on new micro-exporters is not free from limitations. First of all, the sample of firms only includes one country, Spain, so the hypothesis should be tested for other countries to corroborate the results. Secondly, the sample only covers manufacturing firms. In contrast to manufactured goods, many services are usually immaterial, not storable and they require proximity between consumer and supplier. Despite some exceptions where the trade of services is similar to the trade of goods, such as services which can be stored like CDs and services which can be delivered long-distance through telecommunication and information technologies like call centers (Vogel, 2011), certain attributes of the international trade of services such as intangibility and inseparability diverge from those attributes of manufactured products, and they might influence the export entry strategies of services exporters. And thirdly, the ESEE database does not give detailed data on the export entry strategies adopted by firms, such as a description of export countries and volumes, if product innovation is associated with export markets and it does not present a more structured classification of the export channels, all of which does not allow to present more export-oriented results. Besides, the ESEE publishes data on export destination areas and export channels every four years, reducing the reliability of some results.

7.2. Business strategy implications, economic policy implications and avenues for further research

When there is not a SS effect of micro-exporters into exports, but what we observe is the high export entry cost required for large firms to serve ample portions of the export market, it means that (almost) all firms can access the international market if they select the appropriate export entry strategy, but (most) with few possibilities of survival.

The importance of selecting the proper export entry strategy has been already outlined by the relevant business strategy literature. Firstly, by the transaction cost theory which advocates that firms will make their export entry decisions based on the efficiency of the different export entry strategies, emphasizing the cost optimization (Klein et al., 1990; Shervani et al., 2007) where firms will use the most efficient export entry mode from a cost optimization perspective. For instance, internalizing the export operations and their associated costs using investment export channels may be inefficient for firms with low exported volumes, while the use of contractual channels might be more cost-efficient.

Nonetheless, some authors propose that the transaction cost theory tends to provide only a description of firm activities instead of prescriptive solutions, as it does not tie the export choice to export performance. Transaction cost theory focuses to a great extent on cost minimization but not enough on profit maximization. So, alternatively it has been proposed the resource-based view (RBV) theory, which suggests that the way a company deploys its internal capabilities and resources has a significant impact on performance. Firms that align their organizational structures with their internal capabilities and resources will achieve superior performance levels (Barney et al., 2001; Brouthers et al., 2008). For example, the firm's ability to offer customize solutions to the international market by leveraging its internal capabilities, such as developing new products versus exporting existing ones, might result in superior export performance levels (Morgan et al., 2009).

In addition to this, there is a third school of thought which links the transaction cost theory and the RBV which believes that aligning the cost optimization perspective with the firm´s internal capabilities yields the better export performance (He et al., 2013). Therefore, when a firm is deciding the export entry mode, it must select those strategies which minimize the export entry cost at the same time that they leverage the internal capabilities and resources.

The presented export entry conceptual framework proposes that small firms with scarce resources, by taking into account the limitations of their internal capabilities (RBV), select those export entry strategies which minimize the export entry cost (transaction cost theory) as the most effective tactic available to access the international market, maximizing its profits from the export activity as opposed to obtaining no profits by being unable to enter the export market. It is often assumed that firms select export markets on a rational basis but it might be more realistic to recognize that a non-systematic, strongly personalized and essentially belief-driven selection process is a characteristic of many selection decisions (Alexander et al., 2007). In this regard, the proposed export entry conceptual framework offers some insight for firm managers and owners into the causes and consequences which might be behind some export entry decisions, particularly for small firms, which can take into consideration when selecting their own export entry strategies.

Regarding the economic policy implications, the conceptual framework does not support a deterministic approach to the export decision as the entry cost is endogenous to the firm's export entry strategy based on its internal capabilities and resources, rather than predetermined by its productivity level. Therefore, the existence of an entry cost is no longer a valid answer to the question why some firms export while others do not.

Export promotion programs (EPP) should take into consideration this perspective when they define the export support activities and the expectations about their results. As a starting point, in the same way that some export promotion agencies (EPA) already do, EPAs should not only collect and analyze basic data such as the yearly financial statements in order to categorize, by groups, the targeted firms and their capabilities to compete in the export markets but also offer, according to the export entry strategies outlined, different export promotion packages adjusted to their international abilities. Firms have different competencies, resources and strategies and therefore, they face different obstacles to achieve their export objectives. Hence, firms differ greatly in their export assistance needs depending on their international strategies (Francis and Collins, 2004).

The avenues for further research point to an enrichment of the proposed basic export entry framework for new micro-exporters to better understand the managerial motivations behind the beginning of the international venture, the obstacles which a firm faces when it is trying to enter the export market and how best it can cope with them, the most cost-efficient export entry strategies and the optimal strategies for small firms which want to become exporters to access the export market with ease. This enrichment of the basic export entry framework for new micro-exporters could be greatly supported by firm-level case studies focused on the export entry decision of new micro-exporters.

Moreover, given the limitations of this study and the ubiquity of micro-exporters around the world, the test of the SS hypothesis on new micro-exporters can be performed in new countries other than Spain, including firms from the services sector to try to replicate the results obtained and validate the conceptual framework. Any theory that intends to be general, independent of the economic and social context, should be tested using data from more than just one population. These scientific replication studies, by using a different second dataset, permit that the credibility of a new finding is far more than twice that of the result based only in one dataset (Hamermesh, 2007).

Annexes

Table a11. Summary of the relevant NNTT literature to the self-selection effect

Year	Author/s	Data	Methodology	Results for the self-selection effect
1995	Bernard and Jensen	56,000 US manufacturing firms for the period 1976-1987. Plants with more than 250 employees are sampled with certainty, others with probability <1	Descriptive statistics OLS regression	The authors do not test specifically for the SS hypothesis. However, indirectly they obtain that exporters have better performance characteristics than non-exporters but that exporting does not increase performance growth, specifically the labor productivity level measured as valued added per worker and sales per worker. Therefore, they infer that successful firms become exporters, supporting the SS hypothesis
1997	Bernard and Wagner	Near 4,330 Lower Saxony (Germany) manufacturing plants with at least 20 employees for the period 1978-1992	OLS regression	The authors find that good firms become exporters since most of the performance advantages of exporters are present 3 years before entry into exports. They also obtain that growth rates of employment, sales and labor productivity, measured as sales per worker and valued added per worker, for exporters are faster than for non-exporters in the years leading up to exporting. Firms must succeed in order to begin exporting including a rapid growth of employment and output and a sharp increase in productivity before starting to export. The authors find support for the SS effect

1998	Clerides, Lach and Tybout	Colombian plants with at least 10 workers for the period 1981-1991, for Mexico 2,800 large firms for the period1986-1990, and for Morocco firms with at least 10 workers for the period 1984-1991. All export-oriented industrial plants	Probit model	The results signal that the positive association between export status and productivity is due solely to the SS of relatively more efficient plants into foreign markets, as future exporters have lower average variable costs and higher labor productivity, measured as sales per worker, than non-exporters before starting the export activity. The data obtained is aligned with the SS hypothesis where more productive firms self-select into the export market
1999	Bernard and Jensen	50,000-60,000 US manufacturing firms for the period 1984-1992. Plants with more than 250 employees are sampled with certainty, others with probability <1	OLS regression	Firms that become exporters, 2 to 3 years before starting to export, are larger in terms of employment and shipments, they have higher labor productivity levels measured as value added per worker, and they pay higher wages than firms that remain non-exporters. However, when productivity differences between future exporters and non-exporters are measured as TFP they are positive but not statistically significant. These results partially support that good performance leads to exporting and are aligned with the SS hypothesis
2000	Aw, Chung and Roberts	About 12,000 manufacturing plants in Taiwan for the years 1981, 1986 and 1991, and 22,000 plants with more than 5 workers for South Korea manufacturing plants for the years 1983, 1988 and 1993. Only manufacturing plants from 5 major export industries	OLS regression	For the 5 export-oriented industries of Taiwan plants that choose to enter the export market have significantly higher average productivity prior to entry, measured as TFP, than plants that stay out of the export market, which is consistent with the SS hypothesis. For South Korea, in all 5 industries, plants that choose to enter the export market have higher productivity prior to entry into the export market than non-exporters, but the difference is not statistically

				significant in 2 of the 5 industries. There is evidence aligned with the SS hypothesis of the most productive firms into exports
2001	Isgut	10,747 Colombian manufacturing plants with 10 or more employees for the period 1981-1991	OLS regression	Exporters, on average, are larger, more capital intensive, have higher labor productivity measured as sales per worker and value added per worker, and pay higher wages than non-exporters, already three years before starting to export. The author finds evidence in favor of the SS effect. The only performance characteristic for which future exporters do not have a premium over non-exporters before starting to export is the blue-collar workers wages
2002	Castellani	2,117 Italian manufacturing firms with more than 10 employees that answer two waves of surveys in the year 1989 and 1992	OLS regression	Firms that will become exporters, in the years that precede exporting, tend to perform better than firms that will keep selling only in the domestic market. However, future exporters do not exhibit faster productivity growths, measured as TFP, before starting to export than non-exporters. The authors find evidence in favor of the SS hypothesis among exporters
2002	Delgado, Fariñas and Ruano	About 1,800 Spanish manufacturing firms per year with at least 10 employees for the period 1991-1996. Includes with certainty 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	One and two-sided Kolmogorov-Smirnov tests	The authors obtain that firms that eventually enter the export market are more productive, measured as TFP, than non-exporters before entry into the international market. There is stochastic dominance on the productivity level of entering exporters versus non-exporters for the whole population of firms, supporting the hypothesis of the SS of the most productive firms into the export market

2002	Hallward, Iarossi and Sokoloff	Around 2,700 manufacturing establishments in 5 East Asian countries with 20 or more employees for the period 1996-1998	OLS regression	The authors obtain results aligned with the SS effect as future exporters consistently make different decisions regarding investments, trainings, technology and the selection of inputs to raise their productivity before starting to export in order to compete with guarantees in the international market. They call this process conscious SS. The productivity level, measured as TFP, of future exporters before starting to export is higher than the productivity level of non-exporters
2002	Wagner	Lower Saxony (Germany) manufacturing plants with at least 20 employees for the period 1978-1989	Descriptive statistics	New exporters are larger and pay higher wages than non-exporters the previous year to start exporting. However, their labor productivity measured as sales per worker is slightly lower. Nevertheless, their productivity growth is faster during the previous years to start exporting and the year they start to export, so that new exporters become more productive than non-exporters at the time of beginning to export. The results obtained seem to support the SS hypothesis
2003	Baldwin and Gu	Canadian manufacturing firms using survey data for large plants and tax records data for smaller firms, for the years 1974, 1979, 1984, 1990, 1993 and 1996. All small firms are assumed to be non-exporters	OLS regression	The authors find that more productive plants self-select into export markets as entrants to the international market (new exporters) are more productive, measured as TFP and labor productivity by value added per worker, than non-entrants (non-exporters). There is evidence in favor of the SS hypothesis of the most productive firms into the export activity

2004a	Bernard and Jensen	50,000 to 60,000 US manufacturing plants for the period 1983-1992. Plants with more than 250 employees are sampled with certainty, and others with probability <1	OLS regression	New entrants into exporting have productivity levels, measured as TFP, significantly higher than continuing non-exporters. Moreover, new exporters are relatively more productive before they enter the export market even two years before entry. The authors obtain evidence in favor of the SS effect where the most productive plants are more likely to become exporters
2004	Girma, Greenaway and Kneller	8,992 UK manufacturing companies over the period 1988-1999. The authors omit foreign firms, parent firms and 1 percent top and bottom outliers	Probit model	The probability of exporting increases with the size and the productivity level of the firm, measured as TFP. The results obtained are aligned with the existence of a SS effect of the most productive firms into the export market
2004	Mengistae and Pattillo	About 230 manufacturing firms per year for Ethiopia, Ghana and Kenya during the period 1992-1995 (depending on the country) and focused on some industries such as woodwork and metalwork	Generalized least squares (GLS) estimator OLS regression	The authors find indirect evidence against the SS effect. Exporters are more productive, measured as TFP, than non-exporters when the lagged export status of the firm is taken into account. When the contemporaneous export status is used, consistent with the SS effect, the exporter productivity premium diminishes. However, the SS effect may be present as firms need high levels of productivity to survive the competitive pressures in the export markets outside Africa
2005	Alvarez and López	7,132 Chilean manufacturing plants with at least 10 employees for the period 1990-1996	Probit model	Plants that initially are more productive, measured as TFP, larger, more foreign owned, have a higher share of skilled workers and spend more money on foreign licenses, are more likely to enter the export market. As highly productive firms tend to become exporters

				more frequently the results obtained are aligned with the SS hypothesis
2005	Arnold and Hussinger	389 German small, medium and large sized manufacturing firms for the period 1992-2000	Probit model Granger-causation test	The authors find that causality runs from productivity to exporting and not vice versa (from exporting to higher productivity). Good firms are more likely to start exporting since productivity, measured as TFP, increases the probability of exporting, along with firm size and R&D intensity. Firms tend to have desirable performance characteristics already before taking up export activities. There is evidence in favor of SS hypothesis of the most productive firms into foreign markets
2005	Greenaway, Gullstrand and Kneller	3,570 Swedish manufacturing and services firms for the period 1980-1997	Descriptive statistics	The data supports that new exporters have lower productivity levels, measured as TFP, before starting to export than non-exporters. They also have lower volumes of sales, they employ less workers and pay lower wages before the export activity takes place. There is no evidence favorable to the SS effect as the productivity of exporters before entry into exports does not appear to differ significantly from the productivity level of non-exporters
2005	Hahn	Near 80,000 South Korean manufacturing plants per year, with 5 or more employees for the period 1990-1998	Descriptive statistics OLS regression	Exporters have, on average, more workers, output and capital intensity than non-exporters, before starting to export. They are also more labor productive, measured as sales per worker and value added per worker, than domestic firms. However, on average, the ex-ante TFP level of exporters is estimated to be no higher than for

				non-exporters. The author finds some evidence that points towards the existence of a SS effect of exporters into the export market
2006	López	3,427 Colombian manufacturing firms for the period 1992-2002	Logit robust model with fixed effects	Firms with low average variable costs and high levels of capital stock, have a higher probability of becoming exporters. Besides, a currency depreciation increases the probability that a firm starts to export. The results obtained are aligned with the SS effect
2007	Aw, Roberts and Winston	Large and technologically advanced Taiwanese manufacturing firms in the electronics industry for the years 1986, 1991 and 1996	Probit model	The authors find that the decision to export is affected by the productivity of a firm. Highly productive firms, measured as TFP, are more likely to become exporter than low productive firms. This finding is consistent with the SS hypothesis, where initial entry into the export market involves sunk costs, and where high-productivity firms are more likely to self-select into the export market
2007	Fariñas and Martín	About 1,800 Spanish manufacturing firms per year with at least 10 employees for the period 1990-1999. Includes with certainty 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	OLS regression Generalized method of moments (GMM) estimator	The results obtained show that the productivity level of entering exporters, measured as TFP, is significantly higher than the productivity level of non-exporting firms, supporting the SS hypothesis of the most productive firms into the export market
2007	Wagner	54 NNTT empirical papers for 34 countries that use micro-data at the firm level published between 1995 and 2006	Meta-analysis	The big picture which emerges from the relevant literature presents evidence in favor of the SS hypothesis. Future export starters tend to be more productive than future non-exporters years before they enter

				the export market. The good firms become exporters, specially firms with high productivity levels measured with different indicators such as labor productivity, average costs and TFP
2008	Blanes, Dovis, Milgram and Moro	756 Spanish manufacturing firms with more than 10 employees for the period 1991-2002	Probit model	There is positive evidence in favor of the SS effect, as more productive companies, measured as labor productivity by value added per worker, tend to become exporters. Additionally, firms that are older, larger in terms of sales and employment, more foreign owned, and more R&D intensive, present a higher probability of starting to export. The results obtained are aligned with the SS hypothesis of the most productive firms into the export activity
2008	ISGEP	Firm level data for companies with at least 20 employees for 14 different countries of EU, Latin America and China	OLS regression	The authors find positive evidence in favor of the SS hypothesis. For most of the cohorts of new exporters versus non-exporters, the pre-entry productivity premium, measured as labor productivity by total sales per employee, is positive and statistically significant. This result indicates that more productive firms tend to become exporters, while low productive firms tend to remain non-exporters
2008	Serti and Tomasi	38,771 Italian manufacturing firms with 20 or more employees for the period 1989-1997. Dataset of near 20,000 firms per year	OLS regression	The data analyzed shows that future exporters display some advantages with respect to firms that do not take up exporting. Firms that become exporters are more productive, measured as TFP and labor productivity by value added per worker, more cost competitive, larger in terms of sales and employment, more capital intensive, and present a higher share of white collar workers, before

				becoming exporters, than firms that do not become exporters. The results are aligned with the SS hypothesis
2009	Granér and Isaksson	161 Kenyan manufacturing firms in four main cities with more than 5 employees, for the period 1992-1994	Binary logit model Multinomial logit model	More technical efficient firms are more likely to become exporters, especially if they target developed countries, providing support for the SS hypothesis, because relatively efficient firms self-select themselves into the export market. Moreover, larger firms in terms of output, younger firms, and firms with more foreign ownership are more likely to become exporters. However, the wages paid by the firm and the capital intensity do not have a significant effect on the export entry decision of a firm
2009	Máñez, Rochina and Sanchis	693 Spanish manufacturing firms with at least 10 employees that continuously operate for the period 1990-2000. Includes with certainty 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	Probit model One and two-sided Kolmogorov-Smirnov tests	More labor productive firms, measured as sales per worker, in year *t-1*, self-select into exporting in year *t*. There is evidence in favor of the SS effect. Process innovation in year *t-3* increases firm productivity in *t-1* and, in turn, this increases the probability of exporting. Process innovation creates an indirect channel of SS into exports. However, product innovation in year *t-3* has no effect on productivity in *t-1*
2010	Avella and García	Near 2,469 Spanish SMEs from the manufacturing sector with less than 250 employees, independently owned and with sales no higher than Eur 50 million, for the period 1990-2002	OLS regression	Spanish SMEs exporters are more productive, measured as labor productivity by value added per worker, than non-exporters before starting to export. Future exporters also tend to improve more their productivity during the three years prior to start exporting than non-exporters. Additionally, a higher economic profitability stimulates firms to initiate exports if the competitive pressure in the local

				market is not too high. The results support the existence of a SS effect
2010	Kox and Rojas	Dutch manufacturing and services firms with 50 or more employees sampled with certainty and with less than 50 employees sampled on a rotatory basis, for the period 1999-2005 Dutch manufacturing and services firms with equity higher than Eur 23 million, for the period 1997-2005	Probit model OLS regression	The authors find evidence in favor of the SS effect as the labor productivity level, measured by value added per worker, of manufacturing exporters is higher than the productivity level of manufacturing non-exporters, even 3 year before starting to export. However, for services firms the SS effect can be observed only during the prior year to start exporting, but not 3 years before starting to export
2010	Van Beveren and Vandenbussche	189 Belgian firms with at least 10 employees and data for two periods: 1988-2000 and 2002-2004	Probit model	Future exporters are larger in terms of sales and employment, and they are more productive, measured as TFP, than non-exporters, 4 years prior to start exporting. They also exert greater innovative efforts in terms of R&D intensity, product innovation and process innovation. There is positive evidence in favor of the SS effect of the most productive firms into exports, but also a SS effect of the most productive firms into innovation activities. Firms which have good prospects of entering the export market are more likely to invest in innovation activities, such as investing in product and process innovations, which combined increase the probability of starting to export

2010	Yang and Mallick	2,340 Chinese firms with 15 or more employees for the period 2000-2002, from 18 major Chinese cities	Propensity score matching (PSM) method	Exporters, on average, tend to have more productivity, measured as TFP and labor productivity by sales per worker, than non-exporters the year before starting to export. The authors find evidence in favor of the SS effect. Moreover, exporters tend to be larger in terms of sales and employment than non-exporters the year before they start to export. However, analyzing these indicators 2 years before starting to export, future exporters do not show better performance attributes than non-exporters
2011	Ranjan and Raychaudhuri	Large Indian manufacturing firms for the period 1990-2006. The mean size of the firms sampled exceeds 3,000 employees (large firms sampled)	Probit model	The data shows that exporters, previous to start exporting, have, on average, higher productivity levels, measured as TFP, than non-exporters. Exporters are also larger than non-exporters in terms of employment and they are more capital intensive before starting to export. The authors find compelling evidence aligned with the SS hypothesis, where more productive firms are more likely to become exporters
2011	Sharma and Kumar	Indian manufacturing firms for the period 1994-2006, for four industries: cotton textile, electrical, pharmaceutical and transport equipment	GMM estimator	The authors find positive but weak evidence in favor of the SS effect. Only in the cotton and transportation equipment industries, the previous levels of firm productivity, measured as TFP, are related to export participation. These results only provide some weak support for the SS hypothesis
2011	Vogel	German services sector firms with at least one insured employee and firm turnover	OLS regression	In both parts of Germany (East and West) services sector exporters show higher labor productivity levels, measured as sales per worker,

		higher than Eur 17,081, for the period 2001-2005		3 years prior to start exporting, than non-exporters. The results are aligned with the SS effect of the most productive firms into the export market
2012	Barboni, Ferrari, Melgarejo and Peluffo	1,330 Uruguayan manufacturing plants with more than 5 workers for the period 1997-2005	Probit model OLS regression	Firms that initially are more productive, measured as TFP, and larger in terms of employment, are more likely to enter the export market. Besides, a higher productivity level is far more important than size or foreign ownership to explain firm entry into developed countries, supporting the existence of the SS hypothesis
2012	Haidar	33,510 domestically owned Indian manufacturing firms for the period 1991-2004	OLS regression	The author finds that there are clear differences between export starters and non-exporters 1 to 3 years before starting to export. Export starters sell more, employ more capital, and they are more productive, measured as TFP, than non-exporters. The evidence obtained is in favor of the SS effect, as better firms make it into the export market more often than firms with bad performance characteristics
2012	Wagner	25 NNTT empirical papers for 11 countries that use micro-data at the firm level, published between 2006 and 2011	Meta-analysis	All the evidence contained in the papers analyzed by the meta-analysis points towards the existence of a SS effect of the most productive manufacturing and services sector firms into exports. Even if the productivity level of new exporters and non-exporters is measured with different indicators of productivity, such as labor productivity, average costs, and TFP, exporters, on average, are more productive than non-exporters prior to start exporting

2013	Boermans	More than 1,000 SMEs manufacturing firms from Ghana, Kenya, Nigeria, South Africa and Tanzania for the period 1991-2003	GLS estimator	The data analyzed supports that African SMEs in the manufacturing sector are more competitive before they start to export than non-exporting peers. Moreover, firm size, foreign ownership and human capital positively affect the decision to export. There is evidence favorable to the SS effect. However, the SS hypothesis is not tested with productivity levels, only with other firm performance indicators
2013	Temouri, Vogel and Wagner	Data for British, French and German firms operating in the business services sector with more than Eur 250,000 in turnover per year	OLS regression	Export starters in France, Germany and UK pay higher average wages and show significant higher labor productivity levels, measured as sales per worker and value added per worker, than non-exporters. Regarding profitability no significant differences between export starters and non-exporters are found in France and UK. For Germany, export starters are even less profitable than non-exporters in the year they start to export. These differences in productivity also exist 1 and 2 years before the prospective exporter starts to export. The authors obtain evidence in favor of the SS effect of the most productive firms into exports
2014	Bravo, Benavente and González	Chilean manufacturing firms with 10 or more workers for the period 1997-2004	Asymptotic least squares (ALS) regression	The results obtained are not consistent with the hypothesis of the SS of the most productive firms into exports. More productive firms, measured as TFP, do not self-select into exports. However, the results point to an exporting-by-innovation effect, where firms that invest more in R&D have a greater tendency to become exporters

2014	Foster, Isaksson and Kaulich	3,090 manufacturing firms and 2,391 services firms for 19 countries in sub-Saharan Africa, for the year 2010, with stratified sampling according to their size	Inference	Indirect evidence for the SS of the most labor productive firms, measured as sales per employee, into export markets. According to the authors, given the identified low levels of learning obtained from the export activity, most of the productivity differences between exporters and non-exporters can only be attributed to the SS of the most productive firms into exports. Therefore, the authors infer the validity of the SS hypothesis
2014	Minondo	Approximately 17,000 Spanish services sector firms per year with 10 or more employees for the period 2001-2007	OLS robust regression	The author finds significant differences in the labor productivity level between future export starters and non-exporters several years before starting to export, validating the SS hypothesis. Moreover, the labor productivity premium tends to rise as firms approach the entry year, suggesting that future exporters may consciously prepare to export
2015	Casas, Díez and González	Over 4,000 Colombian non-commodities manufacturing firms for the period 2005-2013. The average firm employs 160 workers (large firms sampled)	OLS regression Probit model	Future exporters had slightly higher productivity levels, measured as TFP, than non-exporters, before they become exporters. The age of a firm, its size, and its productivity level, are positively associated with a higher probability of becoming an exporter. The results reassert the SS hypothesis by which more productive firms self-select into the export market

2015	Máñez, Rochina and Sanchis	2,182 Spanish manufacturing firms with at least 10 employees for the period 1990-2009. Includes with certainty 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	OLS robust regression GMM method OLS regression with random effects	The authors find that sunk costs are relevant both for exporting and for performing R&D activities, although larger for exporting than for R&D. There is evidence in favor of the SS effect for exporting and R&D activities. New exporters are more productive, measured as TFP, before starting to export than non-exporters. However, both activities are closely interrelated. When a firm starts exporting this may increase its productivity, and it makes more likely that the firm starts performing R&D activities
2016	Vu, Holmes, Tran and Lim	1,664 Vietnamese non-state owned domestic manufacturing SMEs, with data for the years 2005, 2007 and 2009, including firms from the informal sector	Probit robust model with random effects	The data shows that the role of productivity, measured as TFP and labor productivity by value added per worker, determines the probability of export participation. However, 2 years prior to start exporting, the productivity difference between future exporters and non-exporters disappears. These findings support the SS hypothesis that occurs for more productive firms in regards to export participation
2017	Cieślik and Michałek	Manufacturing and services sector private firms for 17 European and Central Asian countries for the period 2011-2014	Probit model	The results indicate that the probability of exporting is positively associated to product and process innovations, to labor productivity measured as sales per worker, and to R&D spending, firm size, foreign capital, and the use of foreign licenses. However, management and marketing innovations are not good indicators of future export entry. These results support the SS hypothesis by which only the most productive firms self-select into the export market

2017	Cruz, Newman, Rand and Tarp	5 surveys for 275 Mozambican manufacturing firms for the period 1999-2006. The average size of firms in the sample is larger than the average size of firms in the population (large firms sampled)	Probit robust model	The authors find no evidence of the SS effect. Previous labor productivity levels, measured as total sales per worker, do not seem to be a good predictor of future export participation. The labor productivity level of a firm in the previous years to start exporting has a positive but insignificant effect on the export entry decision of a firm
2017	Newman, Rand, Tarp and Anh	Vietnamese firms for the period 2005-2012. Firms with more than 30 employees are included with certainty in the sample, smaller firms not	OLS regression with fixed effects	Firms that enter the export market have a higher level of labor productivity, measured as value added per worker, in the period prior to start exporting than firms that never export. This productivity difference between new exporters and non-exporters exists up to 4 years before entry into exports. These results support the SS hypothesis
2017	Rehman	More than 15,000 manufacturing and services sector formal firms from 29 Eurasia and Central and Eastern Europe countries with 5 or more employees, for the year 2011	Crépon, Duguet and Mairesse (CDM) model	The author finds that more productive firms, measured as TFP, tend to self-select into exports as a small increase in firm's productivity highly increases the probability that a firm becomes an exporter. The results are aligned with the SS hypothesis. Additionally, innovation activities and R&D expending also have a positive impact on firm´s productivity
2017	Siba and Gebreeyesus	About 1,000 Ethiopian manufacturing firms with at least 10 employees for the period 1996-2009	Probit model Dynamic probit model	The data shows that more labor productive firms, measured as sales per worker, self-select into the export market, but only when the unobserved firm heterogeneity characteristics are not controlled for. Firm characteristics such as age, size and type of ownership also

				affect significantly the probability of exporting. The authors find positive but weak evidence in favor of the SS effect of the most productive firms into the export market
2018	Yun	Vietnamese manufacturing micro, small and medium enterprises (MSME), with no more than 200 workers, for the years 2011, 2013 and 2015	Probit model	The author finds that less labor productive firms, measured by value added per worker, firms with higher wages and firms with greater capital intensity, are more likely to become exporters. Furthermore, firms with prior export experience and firms that invest in product innovations are also more likely to export. However, the strongest factor affecting the decision to export is prior export experience which is significant for pure exporters, for exporters included in a global value chain and for exporters to foreign invested companies. Therefore, the data is not aligned with the SS hypothesis as less productive firms are more likely to become exporters

Table a12. Descriptive statistics for all the variables included in the research model for the SS effect by export status group, panel data for the period 1990-2015 (constant values in euros)

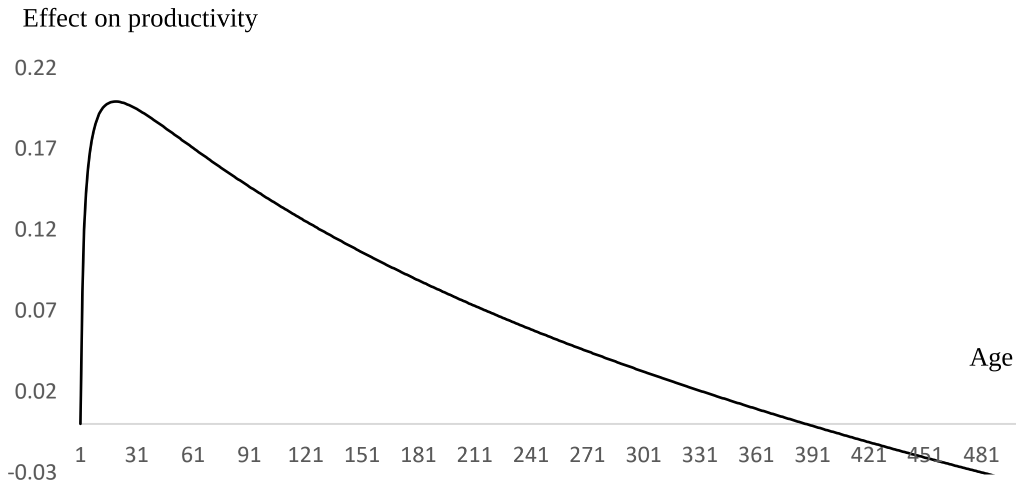
Export status					
New micro-exporters <= €25,000/year					
Variable	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_{t-1}$	9,533.24	677,806.30	84,460.81	71,542.84	65,854.23
VA/worker $_{t-1}$	1,574.78	120,738.60	31,736.18	28,567.02	17,174.59
Wage/worker $_{t-1}$	7,212.45	61,459.83	23,928.05	22,502.90	8,915.54
Age $_{t-1}$	2	120	19.62	18	14.36
Capital/worker $_{t-1}$	84.68	629,041.50	43,103.86	27,986.60	61,142.83
Foreign $_{t-1}$	0	48	0.26	0	3.55
R&D/sales $_{t-1}$	0	21.90	0.44	0	2.39
Sales/hour $_{t-1}$	8.90	380.79	48.01	41.41	37.18
VA/hour $_{t-1}$	1.47	65.52	17.98	16.29	9.48
Wage/hour $_{t-1}$	4.22	34.57	13.72	12.74	5.07
Marketing/sales $_{t-1}$	0	9.50	0.67	0.20	1.14
New micro-exporters <= €50,000/year					
Variable	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_{t-1}$	9,533.24	2,648,969.00	100,354.50	74,116.62	168,875.10
VA/worker $_{t-1}$	1,574.78	274,085.40	33,696.91	29,540.69	22,868.22
Wage/worker $_{t-1}$	6,081.40	61,459.83	23,760.21	21,908.89	9,180.24
Age $_{t-1}$	2	120	20.33	18	14.32
Capital/worker $_{t-1}$	84.68	629,041.50	42,248.58	26,499.38	63,892.36
Foreign $_{t-1}$	0	50	0.34	0	4.07
R&D/sales $_{t-1}$	0	21.90	0.34	0	1.94
Sales/hour $_{t-1}$	8.90	1,513.70	57.48	42.15	98.97
VA/hour $_{t-1}$	1.47	156.62	18.91	16.56	12.98
Wage/hour $_{t-1}$	3.66	34.57	13.50	12.36	5.24
Marketing/sales $_{t-1}$	0	9.50	0.65	0.20	1.16
All non-exporters (quitters included)					
Variable	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_{t-1}$	467.55	3,252,992.00	108,236.00	74,948.56	129,855.00
VA/worker $_{t-1}$	14.30	646,356.50	36,629.00	30,096.68	28,359.40
Wage/worker $_{t-1}$	2,022.30	166,941.30	25,160.2	23,104.20	11,214.42
Age $_{t-1}$	1.00	154.00	22.41	18.00	19.28
Capital/worker $_{t-1}$	36.98	6,527,156.00	54,484.08	24,672.58	123,850.40
Foreign $_{t-1}$	0.00	100.00	2.72	0.00	14.93
R&D/sales $_{t-1}$	0.00	166.29	0.27	0.00	2.08

Sales/hour $_{t-1}$	0.28	2,168.66	61.54	42.57	74.34
VA/hour $_{t-1}$	0.01	368.17	20.77	17.06	16.28
Wage/hour $_{t-1}$	1.19	97.06	14.40	13.17	6.56
Marketing/sales $_{t-1}$	0.00	73.30	0.71	0.10	2.18

Non-exporters (quitters excluded)					
Variable	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_{t-1}$	467.55	3,252,992.00	105,975.40	73,917.17	126,828.90
VA/worker $_{t-1}$	14.30	646,356.50	36,205.85	29,852.11	27,811.93
Wage/worker $_{t-1}$	2,022.30	166,941.30	24,955.24	22,961.36	11,045.09
Age $_{t-1}$	1.00	154.00	22.27	17.00	19.19
Capital/worker $_{t-1}$	36.98	6,527,156.00	53,889.84	24,164.00	125,451.60
Foreign $_{t-1}$	0.00	100.00	2.36	0.00	13.86
R&D/sales $_{t-1}$	0.00	166.29	0.25	0.00	2.05
Sales/hour $_{t-1}$	0.28	2,168.66	60.14	41.84	72.45
VA/hour $_{t-1}$	0.01	368.17	20.50	16.88	15.95
Wage/hour $_{t-1}$	1.19	94.79	14.26	13.06	6.42
Marketing/sales $_{t-1}$	0.00	73.30	0.68	0.10	2.12

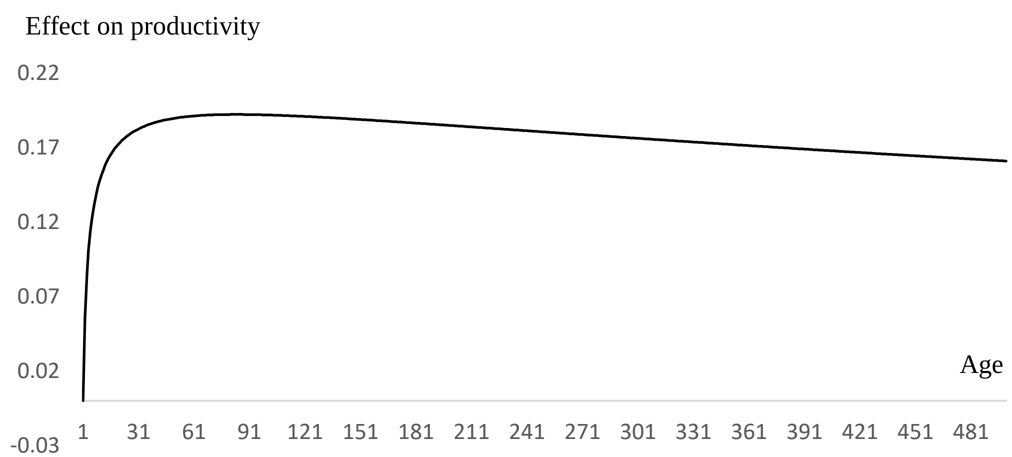
Source: Own elaboration with unbalanced panel data from the ESEE for the period 1900-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Figure a5. Graphical representation of the effect of firm's age on productivity when the dependent variable is sales per worker for the SS effect



Source: Own elaboration with unbalanced panel data from the ESEE for the period 1900-2015. Effect on labor productivity measured as sales per worker for the group of all exporters. Age is measured in years since the company creation. Year of creation has a value of 1. There are no major variations for other groups of exporters.

Figure a6. Graphical representation of the effect of firm's age on productivity when the dependent variable is value added per worker for the SS effect



Source: Own elaboration with unbalanced panel data from the ESEE for the period 1900-2015. Effect on labor productivity measured as value added per worker for the group of all exporters. Age is measured in years since the company creation. Year of creation has a value of 1. There are no major variations for other groups of exporters.

Table a13. Correlation matrix for all the variables included in the research model for the SS effect when the dependent variable is sales per worker

Status: new micro-exporters vs all non-exporters (quitters included)								
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Productivity $_{t-1}$ (log)	1.000							
2. Status $_{t}$	-0.001	1.000						
3. Wage $_{t-1}$ (log)	0.617	-0.015	1.000					
4. Age $_{t-1}$ (log)	0.200	-0.000	0.338	1.000				
5. Age $_{t-1}$ (log) ^{2}	0.211	-0.004	0.345	0.979	1.000			
6. Capital $_{t-1}$ (log)	0.518	-0.011	0.503	0.368	0.358	1.000		
7. Foreign $_{t-1}$	0.210	-0.019	0.241	0.075	0.088	0.154	1.000	
7. Innovate $_{t-1}$	0.124	-0.007	0.131	0.084	0.094	0.124	0.115	1.000

Source: Own elaboration with unbalanced panel data from the ESEE for period 1990-2015. Status includes the group new micro-exporters that do not export more than Eur 50,000/year vs all non-exporters (quitters included), as it subsumes all other groups of new micro-exporters and non-exporters. When correlations are calculated with new micro-exporters that do not export more Eur 25,000/year or non-exporters (quitters excluded) there are no additional correlations higher than 0.500 and the results remain highly consistent.

Table a14. Correlation matrix for all the variables included in the research model for the SS effect when the dependent variable is value added per worker

Status: new micro-exporters vs all non-exporters (quitters included)								
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Productivity $_{t-1}$ (log)	1.000							
2. Status $_{t}$	-0.002	1.000						
3. Wage $_{t-1}$ (log)	0.693	-0.011	1.000					
4. Age $_{t-1}$ (log)	0.217	-0.001	0.342	1.000				
5. Age $_{t-1}$ (log) ^{2}	0.221	-0.005	0.349	0.979	1.000			
6. Capital $_{t-1}$ (log)	0.463	-0.009	0.505	0.370	0.360	1.000		
7. Foreign $_{t-1}$	0.195	-0.019	0.242	0.075	0.089	0.158	1.000	
8. Innovate $_{t-1}$	0.119	-0.007	0.132	0.086	0.095	0.125	0.119	1.000

Source: Own elaboration with unbalanced panel data obtained from the ESEE for period 1990-2015. Status includes the group new micro-exporters that do not export more than Eur 50,000/year vs all non-exporters (quitters included), as it subsumes all other groups of new micro-exporters and non-exporters. When correlations are calculated with new micro-exporters that do not export more Eur 25,000/year or non-exporters (quitters excluded) there are no additional correlations higher than 0.500 and the results remain highly consistent.

Addendum a2

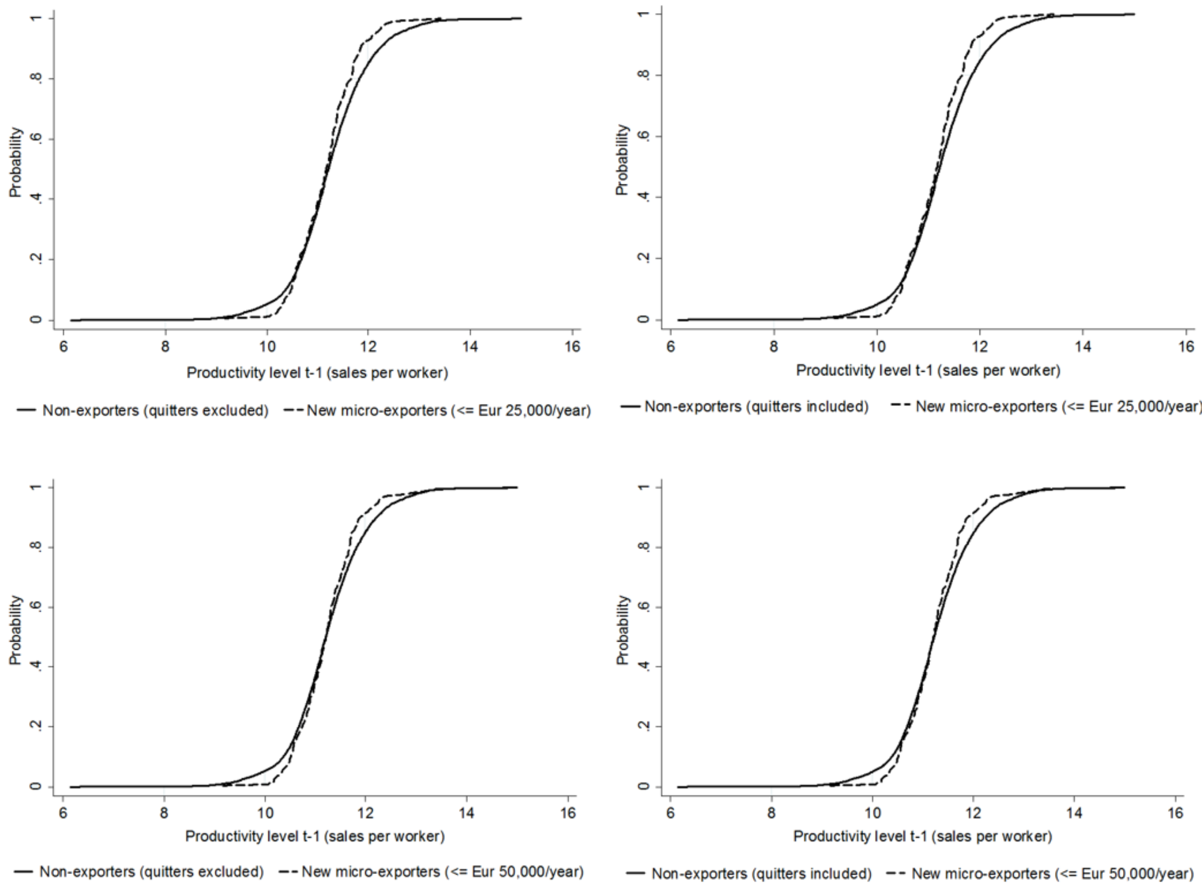
If there is a productivity difference between new micro-exporters and non-exporters before starting to export, as predicted by the SS effect, which shows a selection process of the most productive firms into exports at work with the beginning of the exporting activity, the labor productivity distribution of new micro-exporters must dominate the labor productivity distribution of non-exporters, based on the concept of first order stochastic dominance to establish a ranking for both groups (Máñez et al., 2009).

Being F and G the cumulative labor productivity distribution functions for both groups of firms before starting to export, first order stochastic dominance of F relative to G is defined by the following condition: $F(z) - G(z) \leq 0$ being $Z_1,...,Z_n$ a random sample of size *n*, which corresponds to a group of firms from the distribution function F (new micro-exporters) and $Z_{n+1},...,Z_{n+m}$ a random sample of size *m*, independent of the first one, which corresponds to a different group of firms from the distribution function G (non-exporters), where Z_i represents the labor productivity level of firm *i* (Delgado et al., 2002). Unlike regression analysis, the distribution function comparison does not make any specific assumption about the form of the interdependence between productivity and exports (Cassiman et al., 2010).

To illustrate the comparisons for two different groups of new micro-exporters, those which do not export more than Eur 25,000/year and those which do not export more than Eur 50,000/year, to non-exporters, figure a7 and figure a8 report estimators of the labor productivity distribution functions in year *t*-1, measured as sales per worker and value added per worker, for a visual comparisons between the two groups of new micro-exporters versus all non-exporters (quitters included) and non-exporters (quitters excluded).

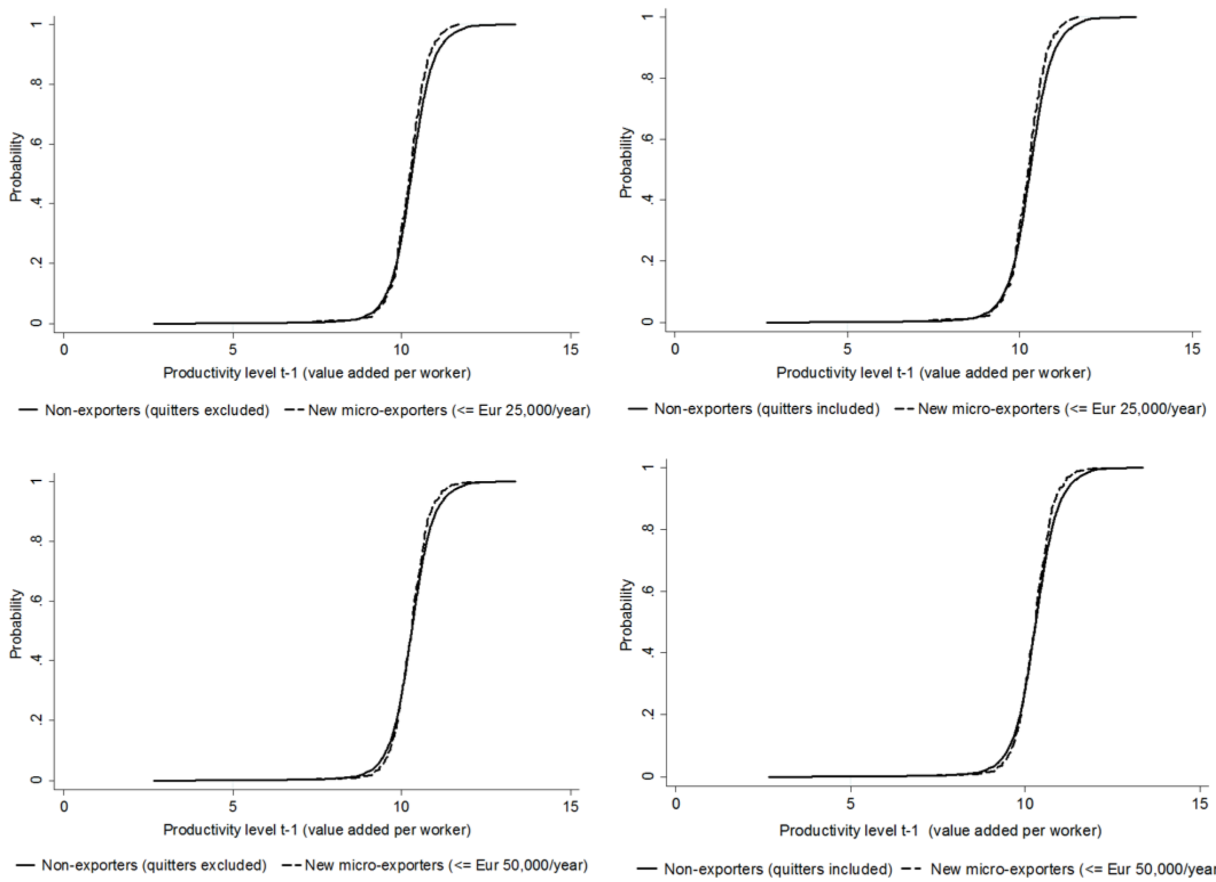
From figure a7 and figure a8 it can be derived that the labor productivity distribution in year *t-1* of new micro-exporters does not stochastically dominate the labor productivity distribution in year *t-1* of non-exporting firms, including and excluding quitters (firms that export in year *t-1* but exit the market in year *t*). These results support the hypothesis that new micro-exporters do not have higher productivity levels than non-exporters before starting to export, as well as they present evidence against the existence of a SS effect for new micro-exporters.

Figure a7. Labor productivity differences for different groups of new micro-exporters versus non-exporters (cumulative distribution function), sales per worker as productivity level for the SS effect



Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Figure a8. Labor productivity differences for different groups of new micro-exporters versus non-exporters (cumulative distribution function),
value added per worker as productivity level for the SS effect



Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Table a15. OLS robust regression with fixed effects for the SS effect, dependent variable sales per worker and marketing intensity as control variable

Variable	Quitters excluded New micro-exporters <= €25,000	Quitters included New micro-exporters <= €25,000	Quitters excluded New micro-exporters <= €50,000	Quitters included New micro-exporters <= €50,000
Status $_t$	-.038*	-.041*	.004	-.004
	(-1.65)	(-1.95)	(0.20)	(-0.26)
Wage $_{t-1}$ (log)	.560***	.565***	.559***	.564***
	(19.41)	(20.39)	(19.45)	(20.42)
Age $_{t-1}$ (log)	.307***	.285***	.307***	.285***
	(3.38)	(3.30)	(3.38)	(3.30)
Age $_{t-1}$ (log)^2	-.118***	-.110***	-.117***	-.109***
	(-3.75)	(-3.63)	(-3.74)	(-3.62)
Capital $_{t-1}$ (log)	.067***	.067***	.068***	.067***
	(6.32)	(6.44)	(6.42)	(6.52)
Foreign $_{t-1}$	.057	.044	.055	.042
	(0.99)	(0.84)	(0.94)	(0.80)
Marketing $_{t-1}$	.082***	.073**	.083***	.073**
	(2.68)	(2.50)	(2.70)	(2.53)
Constant	4.785***	5.003***	4.981***	4.704***
	(9.65)	(13.15)	(11.02)	(8.99)
Year and industry effect	Included	Included	Included	Included

N	2,126	2,267	2,143	2,275
Observations	13,271	14,154	13,369	14,252
Adj. R squared	0.8994	0.8938	0.8993	0.9000

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a16. OLS robust regression with fixed effects for the SS effect, dependent variable value added per worker and marketing intensity as control variable

Variable	Quitters excluded New micro-exporters <= €25,000	Quitters included New micro-exporters <= €25,000	Quitters excluded New micro-exporters <= €50,000	Quitters included New micro-exporters <= €50,000
Status $_t$	-.020	-.030	.025	.006
	(-0.66)	(-1.06)	(0.93)	(0.25)
Wage $_{t-1}$ (log)	.727***	.723***	.726***	.723***
	(20.59)	(20.98)	(20.64)	(21.05)
Age $_{t-1}$ (log)	.245*	.197	.248**	.200*
	(1.96)	(1.64)	(1.99)	(1.68)
Age $_{t-1}$ (log)^2	-.067	-.051	-.067	-.052
	(-1.57)	(-1.25)	(-1.59)	(-1.28)
Capital $_{t-1}$ (log)	.037***	.043***	.038***	.044***
	(2.90)	(3.07)	(2.98)	(3.16)
Foreign $_{t-1}$	-.058	-.027	-.061	-.028
	(-1.20)	(-0.50)	(-1.24)	(-0.52)
Marketing $_{t-1}$	.016	.006	.017	.006
	(0.39)	(0.15)	(0.41)	(0.15)
Constant	2.216***	2.561***	2.224***	1.884***
	(5.76)	(6.47)	(5.77)	(4.10)
Year and industry effect	Included	Included	Included	Included
N	2,112	2,252	2,129	2,260
Observations	13,050	13,902	13,146	13,998
Adj. R squared	0.6765	0.6732	0.6762	0.6735

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a17. OLS robust regression with fixed effects for the SS effect, dependent variable sales per hour worked

Variable	Quitters excluded New micro-exporters <= €25,000	Quitters included New micro-exporters <= €25,000	Quitters excluded New micro-exporters <= €50,000	Quitters included New micro-exporters <= €50,000
Status $_t$	-.037	-.040*	.003	-.007
	(-1.62)	(-1.94)	(0.16)	(-0.43)
Wage/hour $_{t-1}$ **(log)**	.542***	.536***	.541***	.535***
	(18.16)	(18.57)	(18.19)	(18.59)
Age $_{t-1}$ **(log)**	.307***	.285***	.306***	.283***
	(3.39)	(3.27)	(3.38)	(3.26)
Age $_{t-1}$ **(log)** ^{2}	-.119***	-.109***	-.117***	-.108***
	(-3.77)	(-3.58)	(-3.74)	(-3.56)
Capital $_{t-1}$ **(log)**	.069***	.068***	.070***	.069***
	(6.44)	(6.46)	(6.57)	(6.56)
Foreign $_{t-1}$	.063	.048	.061	.047
	(1.12)	(0.95)	(1.06)	(0.91)
Innovation $_{t-1}$	.052	.067**	.052	.067**
	(1.51)	(2.28)	(1.50)	(2.28)
Constant	-2.262***	-2.146***	-2.502***	-2.492***
	(-5.27)	(-5.89)	(-5.15)	(-4.84)
Year and industry effect	Included	Included	Included	Included
N	2,121	2,260	2,137	2,269
Observations	13,231	14,109	13,328	14,206
Adj. R squared	0.8985	0.8928	0.8984	0.8929

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a18. OLS robust regression with fixed effects for the SS effect, dependent variable value added per hour worked

Variable	Quitters excluded New micro-exporters <= €25,000	Quitters included New micro-exporters <= €25,000	Quitters excluded New micro-exporters <= €50,000	Quitters included New micro-exporters <= €50,000
Status $_{t}$	-.017	-.027	.025	.004
	(-0.55)	(-0.97)	(0.93)	(0.18)
Wage $_{t-1}$ (log)	.704***	.694***	.703***	.694***
	(19.27)	(19.37)	(19.32)	(19.43)
Age $_{t-1}$ (log)	.241*	.189	.243*	.192
	(1.90)	(1.56)	(1.93)	(1.59)
Age $_{t-1}$ (log)^2	-.065	-.048	-.065	-.048
	(-1.51)	(-1.15)	(-1.52)	(-1.17)
Capital $_{t-1}$ (log)	.039***	.045***	.039***	.046***
	(2.96)	(3.08)	(3.05)	(3.18)
Foreign $_{t-1}$	-.053	-.023	-.056	-.024
	(-1.10)	(-0.41)	(-1.14)	(-0.43)
Innovation $_{t-1}$	-.029	-.014	-.028	-.013
	(-0.90)	(-0.41)	(-0.86)	(-0.38)
Constant	-4.605***	-4.579***	-5.090***	-5.345***
	(-11.27)	(-11.55)	(-12.85)	(-11.44)
Year and industry effect	Included	Included	Included	Included

N	2,108	2,246	2,124	2,255
Observations	13,013	13,861	13,108	13,956
Adj. R squared	0.6745	0.6706	0.6742	0.6709

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a19. OLS robust regression with fixed effects for the SS effect, dependent variable sales per worker and control variable wage per hour worked

Variable	Quitters excluded New micro-exporters <= €25,000	Quitters included New micro-exporters <= €25,000	Quitters excluded New micro-exporters <= €50,000	Quitters included New micro-exporters <= €50,000
Status $_t$	-.033	-.039*	.008	-.002
	(-1.38)	(-1.79)	(0.43)	(-0.11)
Wage/hour $_{t-1}$ (log)	.469***	.467***	.469***	.466***
	(16.54)	(16.94)	(16.62)	(17.00)
Age $_{t-1}$ (log)	.318***	.299***	.317***	.298***
	(3.44)	(3.38)	(3.44)	(3.39)
Age $_{t-1}$ (log)^2	-.122***	-.114***	-.120***	-.113***
	(-3.83)	(-3.71)	(-3.81)	(-3.69)
Capital $_{t-1}$ (log)	.073***	.073***	.074***	.073***
	(6.81)	(6.88)	(6.90)	(6.96)
Foreign $_{t-1}$	.042	.031	.039	.029
	(0.71)	(0.59)	(0.66)	(0.54)
Innovation $_{t-1}$	.050	.068**	.050	.068**
	(1.44)	(2.16)	(1.44)	(2.16)
Constant	9.315***	9.407***	9.094***	9.097***
	(25.53)	(33.11)	(20.52)	(19.56)
Year and industry effect	Included	Included	Included	Included
N	2,121	2,260	2,137	2,269
Observations	13,231	14,109	13,328	14,206
Adj. R squared	0.9024	0.8967	0.9024	0.8969

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a20. OLS robust regression with fixed effects for the SS effect, dependent variable value added per worker and control variable wage per hour worked

Variable	Quitters excluded New micro-exporters <= €25,000	Quitters included New micro-exporters <= €25,000	Quitters excluded New micro-exporters <= €50,000	Quitters included New micro-exporters <= €50,000
Status $_t$	-.018	-.029	.028	.009
	(-0.55)	(-0.99)	(1.04)	(0.37)
Wage/hour $_{t-1}$ (log)	.630***	.625***	.630***	.625***
	(18.32)	(18.72)	(18.38)	(18.79)
Age $_{t-1}$ (log)	.255**	.210*	.258**	.214*
	(2.01)	(1.74)	(2.05)	(1.78)
Age $_{t-1}$ (log)^2	-.069	-.055	-.069	-.056
	(-1.60)	(-1.33)	(-1.61)	(-1.36)
Capital $_{t-1}$ (log)	.042***	.048***	.043***	.049***
	(3.25)	(3.46)	(3.32)	(3.54)
Foreign $_{t-1}$	-.077	-.044	-.079	-.045
	(-1.51)	(-0.78)	(-1.55)	(-0.81)
Innovation $_{t-1}$	-.030	-.017	-.028	-.016
	(-0.97)	(-0.51)	(-0.93)	(-0.47)
Constant	8.129***	7.491***	7.802***	7.491***
	(31.55)	(22.09)	(36.69)	(22.10)
Year and industry effect	Included	Included	Included	Included
N	2,108	2,246	2,124	2,255
Observations	13,013	13,861	13,108	13,956
Adj. R squared	0.6707	0.6671	0.6705	0.6674

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

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CHAPTER III. THE LEARNING BY EXPORTING EFFECT

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1. Introduction

Learning by exporting (LBE) refers to the mechanism whereby firms improve their productivity after entering the international market. This mechanism is usually mentioned in economic policy, based mainly on case-study evidence, which points to the importance of learning from the export activity through international customers, foreign agencies and rivals about quality, production management, new technology and product development.

In practical terms, the LBE effect can have important positive consequences on productivity at the country level through the population of exporting firms and potential spillover effects from exporters to domestic firms, as well as at the firm level of individual exporting companies, both revealing an outward shifts in the production possibility frontier (PPF). In this regard, most countries provide ample support to their exporters partly in the understanding (or in the belief) that the productivity of these exporting firms, and perhaps of other domestic firms through spillover effects, improves as a result of the exposure to international markets (Atkin et al., 2017). For instance, in Spain a complex structure of national, regional and local public and private agencies actively promotes the commercial activities of Spanish exporters by offering technical support and specialized advice including direct trade missions, reverse trade missions, trainings and workshops, market intelligence, participation in investment forums and fairs, export credit insurance, funds for technological international cooperation and credit for export working capital or foreign direct investments (FDI), among other support programs to exporters.

This extensive system of export promotion programs (EPP) at national, regional and local level is justified in part by the idea that in the presence of LBE effects, trade generates productivity gains which magnify the regular gains from international trade relative to models without learning effects from the export activity. Nevertheless, still there is an ongoing debate within the international trade literature as to whether exporting has a causal effect on firm's productivity improvements (Atkin et al., 2017). So far, the answer to the question if the export activity increases firms' productivity through LBE effects seems to be yes, but only for some countries, for some industries and for some firms, depending on their internal capabilities and export commitment (Martins and Yang, 2009; Wagner, 2012). As firm-level databases employed by the relevant New New Trade Theory (NNTT) literature are often biased towards a minority of large exporters, they distort a reality made up by a large mass of tiny exporters, also called micro-exporters, which in Spain represent more than half of all exporting companies every year. By focusing the analysis of the data on those firms that best represent the large mass of tiny exporters, Chapter III examines if, on average, new micro-exporters do not enjoy higher productivity growths than firms which do not export and if the LBE effect does not have significant effects on new micro-exporters.

Chapter III adds to current international NNTT literature by presenting a conceptual framework to understand the export behavior for the large mass of micro-exporters, given their low productivity levels and few resources and how their export entry strategies interrelate with the LBE effect. It also provides empirical support for the hypothesis that new micro-exporters do not enjoy higher productivity growths compared to non-exporters, presenting evidence against the existence of significant LBE gains on new micro-exporters, while it is in line with previous findings of the NNTT literature which obtain unclear support for the LBE effect. This reality of new micro-exporters has important implications for business strategy on exports and growth and for economic policy, especially on the impact of EPPs.

The structure of Chapter III is organized as follows: section 2 reviews the NNTT theoretical and empirical literature relevant to the LBE effect. Section 3 explains the different sources of learning at a firm level which have been put forward by the relevant literature to generate productivity gains from the LBE effect. Then, it proposes and presents a conceptual framework for new small exporters, called new micro-exporters, which allows to explain the absence of significant LBE productivity gains for micro-exporters. Section 4 includes the research model and the variables of investigation. Section 5 presents the methodology and data used for testing. Section 6 interprets the results obtained by the descriptive and econometric analyses of the data, including several robustness checks. Finally, section 7 explains the main results, the limitations of the investigation, the most important implications at business strategy level and at economic policy level, and it ends with potential avenues for further research.

2. The learning by exporting effect

2.1. Background

The motivation to study the LBE effect arose from the link found in East Asian countries between country exports and economic growth in the 60s and 70s with export-oriented economies such as South Korea and Taiwan, suggesting that exporters may benefit from foreign buyers and competitors by gaining new technical and managerial expertise.

In a case study Rhee et al., (1984) survey 112 South Korean exporters and notice that 40 percent claimed to learn from foreign buyers as they provide the Korean manufacturers with new models and patents to be copied, information on how to make products and even on-site technical assistance in the production line. Later, Grossman and Helpman (1991) develop an endogenous macroeconomic growth model which links exports to performance. In Grossman and Helpman (1991) model trade exposes firms to the knowledge stock of their trading partners, embodied in an exchange where intangible ideas are transferred through the trade of tangible products. This international knowledge is incorporated by exporting firms, allowing them to attain higher productivity levels and explaining the direct link between exports and better performance. At a macroeconomic level Grossman and Helpman (1991) model predicts that trade shifts the domestic productivity frontier outwards, enabling the country to sustain a faster economic growth.

Grossman and Helpman (1991) model is also supported by a World Bank (WB) report which underscores the role of exports helping countries and firms to master international best-practices and obtain advanced technology (World Bank, 1993). First of all, according to the WB report, exports allow the country to obtain the required foreign currency to finance the purchase of more sophisticated machinery, a straightforward method to acquire new technology embedded into the equipment. Secondly, when exports are based on labor comparative advantage international customers often make available new knowledge through blueprints, licenses and on-site technical advice, all in exchange for low-cost and better-quality products from suppliers (World Bank, 1993). This link between exports and knowledge transfers is also supported by Evenson and Westphal (1995) who find that foreign buyers freely provide product designs and technical assistance to improve the production technology of their suppliers in their desire to buy products with more quality and lower prices from exporters. And third, exports increase the competitive pressure for firms and induces them to devote more resources to research and development (R&D) activities in order to reduce production costs and improve quality (World Bank, 1993).

After all this case-study evidence researchers started to verify if the LBE effect found in East Asian countries applies to the rest of the world at a microeconomic/firm level and, if so, how the LBE affects productivity at a firm level.

2.2. Theoretical framework. Learning by exporting as learning by doing

In the late 90s Clerides et al., (1998) create the theoretical pillar of the NNTT literature regarding the LBE effect, presenting a model of export participation with sunk export entry costs into the international market borrowed from the hysteresis literature (Baldwin, 1988; Dixit, 1989; Baldwin and Krugman, 1989)[13] and the existence of learning effects once the firm has accessed the foreign market. Clerides et al., (1998) model, which is a forefather of Melitz (2003) NNTT standard model, set forth profit-maximizing firms which operate in a monopolistic competition market and face a downward sloping demand curve as in Krugman´s New Trade Theory (NTT) models (Krugman, 1979; Krugman, 1980; Krugman, 1981). Moreover, these firms have heterogeneous marginal production costs given by the specific characteristics of each firm such as its capital stock, labor composition and ownership structure.

To allow for the self-selection (SS) of more productive firms into exporting Clerides et al., (1998) model introduces per-period fixed costs for being an exporter such as the cost associated with maintaining an after-sale service network in a foreign market or the marketing cost required to present the products to foreign customers. Given the existence of per-period fixed costs a firm chooses to export when its annual export gross profit is higher than the per-period fixed cost of exporting to obtain a positive net profit from the export activity. The per-period fixed cost of exporting creates a productivity entry threshold into the foreign market. If the marginal production cost is below this threshold the firm has a positive net profit and decides to export. If the marginal production cost is above this threshold the firm has a negative net profit and chooses to serve only the domestic market and not to export. Therefore, exporters have lower marginal production costs

[13] For more information about the hysteresis literature refer to Chapter II, section 2.1.

and higher productivity levels than non-exporters due to the SS effect of more productive firms into the international market.

Clerides et al., (1998) introduces along with per-period fixed costs of exporting significant sunk entry costs such as the cost of gathering information about demand conditions in the foreign country (market research), building up a distribution network and adopting new standards and regulations imposed by the foreign market. These sunk entry costs are paid every time the firm exits the export market and reenters it again but the firm does not have to pay them if it keeps on exporting. The existence of large sunk export entry costs implies that it may be optimal for a firm to continue exporting even if the marginal cost of production temporarily rises due to a transient negative shock and the net profit from exporting turns negative, as the firm avoids to pay the reentry sunk cost to export again Clerides et al., (1998). This effect is better known as export hysteresis, defining hysteresis as the persistence of exporters into the export market, in other words, the higher probability of being an exporter in the next period for current exporters than for non-exporters.

Clerides et al., (1998) model the LBE effect similarly to the learning by doing (LBD) effect proposed by Arrow (1962) where the marginal production cost is a decreasing function of a firm's export experience measured, for instance, by years as an exporter or by cumulative exports. If the marginal production cost is a decreasing function of a firm's export experience it can be said that the export activity lowers the firm's marginal production cost and therefore increases its productivity, so exporting is good for productivity.

LBD is a concept by which productivity is improved through practice, self-challenge and continuous innovation. Starting with the seminal work of Wright (1936) and the learning curve on aircraft production, this field of economic literature documents an association between experience and better performance such as higher labor productivity levels and lower unit costs. Wright's basic concept of the learning curve is that the time (or cost) to perform a task decreases at a constant rate as the cumulative output doubles (Wright, 1936). He finds, for the aircraft manufacturing industry, that every time a company doubles the total cumulated production the cost to manufacture new output goes down 80 percent to the prior cost. As it becomes harder and harder to double a company's previous total output, cost savings slow over time with sharply diminishing returns (Wright, 1936).

Arrow (1962) provides the clearest characterization of LBD as the product of experience and practice, since learning can only take place through an attempt to solve a problem. Therefore, stimulus situations must evolve rather than repeat themselves to constitute a challenge from where to learn, imposing that any learning associated with the repetition of the same problem is subject to sharply diminishing returns.

The LBD suggests that the LBE effect takes place as long as exporting constitutes a challenge for a firm from where to learn from (Fernandes and Isgut, 2005). If a firm needs to improve the production process, develop lean manufacturing, adopt new standards, modernize its machinery and equipment, learn new techniques for quality control, apply just-in-time inventory and retrain workers or hire new ones with special abilities to satisfy the needs of the international market and guarantee the timely delivery of international orders, then the company can benefit from the LBE effect. Throughout the entire process as workers and managers attempt to meet all these new challenges they are likely to learn new abilities, resulting in productivity improvements for the firm.

Clerides et al., (1998) argue that under the existence of sunk entry costs into the export activity and LBE effects the firm's decision whether to export or not becomes a forward-looking problem where a firm considers its current net profit and the expected future payoffs from exporting, which includes the value of avoiding future reentry sunk costs as well as any expected productivity gain from exporting. Hence, a firm decides to export when the sum of all the future discounted net profits from exporting is greater than the sunk entry cost. If all the expected future net profits, LBE productivity gains included, are smaller than the sunk entry cost the firm remains a non-exporter.

This standard model of Clerides et al., (1998) has been employed several times within the NNTT to create adaptations and extensions[14]. One of such is an extension by Trofimenko (2008) to

[14] Another alternative models for LBE are Pack and Saggi (1999) who model LBE as technology transfers from industrial countries to exporters in developing countries which increase the exporters' productivity level, reduce the prices of exported goods (generating savings for importers in industrial countries) and through knowledge spillovers increase market competition in developing countries, increasing the productivity level even more. And Kostevc (2005) who presents a general equilibrium model of trade with monopolistic competition in the foreign market where higher competition generates the need for LBE.

introduce market heterogeneity in the form of different sunk entry costs and productivity gains for each export market. On the one hand, the entry cost is composed of many elements such as the market research cost, most likely higher in markets which lack of precise information, and the product adaptation cost, most likely higher in countries with stricter quality and standard regulations. On the other hand, productivity gains might be higher in markets with tough competition and high standards to meet in terms of quality, safety and timing, as they challenge the exporter by offering a more rigorous learning discipline experience. Each market has its own pros (more LBE/lower entry cost) and cons (less LBE/higher entry cost) so the heterogeneity among countries affect the export decisions of heterogeneous firms and their gains from the LBE effect (Trofimenko, 2008).

All in all, NNTT theoretical models make clear that exporting is not the panacea for firms' productivity growth as, first, firms need to attain a certain level of productivity to become exporters and, second, to benefit from the LBE effect firms need to be challenged by the export market and be able to implement the learning obtained through a serious commitment of effort, resources and time.

2.3. Review of the empirical literature. Mixed and unclear evidence for the learning by exporting effect

Aside from case-study evidence in the 90s came a new strand of empirical literature to replace the macroeconomic-level data studies of the 60s and 70s. For the first time papers employed microeconomic-level datasets to assess the existence of something that resembles the LBE effect, mostly in East Asian countries, but not at a firm level yet.

Starting with Wei (1995) who finds evidence of a relationship between exporting and productivity improvements at an urban level for 74 Chinese cities from 1980 to 1990, explaining the high growth rates of Chinese coastal areas by the effective utilization of foreign investment and export activity. Pack and Page (1994) using cross-country regressions find a connection between the rapid growth of manufactured exports and the rapid productivity growth of the export-oriented manufacturing industries in South Korea and Taiwan. And, Aw and Hwang (1995) report a superior productivity for Taiwanese electronic manufacturing exporters to non-exporters when they manufacture certain products, which varies depending on the electronic product and the model specification produced. However, none of these papers deal with the direct relationship between the export activity and its association with faster productivity improvements at a firm level as required by the LBE effect.

The LBE literature within the NNTT starts with a seminal publication by Bernard and Jensen (1995) who do not specifically test for LBE, as they do not distinguish empirically between SS and LBE, but for the first time they test on a large firm-level panel dataset of United States (US) manufacturing plants from 1976 to 1987 whether or not exporters become more successful than non-exporters after starting to export. The authors do not find any evidence of exporting as an indicator of future success, as employment growth is uncorrelated with the export activity and wage growth is negatively correlated. Nevertheless, they do not test the connection between the export activity and a faster firm productivity growth which the LBE hypothesis advocates.

Following the lead of Bernard and Jensen (1995), Bernard and Wagner (1997) run a regression of changes in plant characteristics comparing exporters to non-exporters with a sample of manufacturing establishments in the State of Lower Saxony (Germany) for the period 1978 to 1992. They find no evidence that sales, wages or labor productivity (measured as sales per worker and valued added per worker) grow faster for exporters during the first year in which they export than for non-exporters, which holds for a five-year horizon and for a nine-year period. They conclude that these results are not in line with the LBE hypothesis as exporting by itself does not improve plant performance. At best, there are no significant differences in the productivity growth of exporters compared to non-exporters since for most time intervals the productivity growth of exporters substantially underperforms that of non-exporters.

Clerides et al., (1998) develop a model consisting of a firm decision to participate in the international market and the firm cost function. They use plant-level panel data for manufacturing establishment in Colombia, Mexico and Morocco for some years from 1981 to 1991 to find that average costs, as a proxy for productivity, and labor productivity do not improve after firms enter the foreign market for Colombian and Mexican exporters. They only obtain significant LBE effects for Moroccan apparel and leather exporters but not for Moroccan chemical exporters. These results lead Clerides et al., (1998) to conclude that there is little evidence to support the LBE hypothesis, where the data resembles a no LBE scenario.

Again, Bernard and Jensen (1999) specifically test for LBE on US manufacturing plants for the period 1984 to 1992 by examining productivity growth rates over short, medium and long periods of time for exporters and non-exporters. Over annual horizons the productivity of exporters, measured as value added per worker and total factor productivity (TFP), grows no faster or even slower than for non-exporters. Over longer horizons, four and eight-year periods, the productivity of exporters grows slower than for non-exporters. In summary, Bernard and Jensen (1999) results do not suggest that at a firm level exporting leads to a faster productivity growth with no evidence in favor of the LBE effect.

Aw et al., (2000) employ a similar empirical strategy to Bernard and Jensen (1999) by comparing the productivity growth rates of exporting and non-exporting plants using data for South Korea and Taiwan factories in five major export industries: apparel, electrical machinery, plastics, textiles and transportation equipment for some years from 1981 to 1993. As the LBE hypothesis implies that the initial productivity difference between new exporters and continuing non-exporters widens following entry into exports, they focus the analysis on productivity changes between new exporters and non-exporters during the entry year and subsequent periods. From this analysis Aw et al., (2000) do not obtain strong evidence in favor of the LBE hypothesis as only electrical machinery, plastic and textile manufacturers from Taiwan show a faster productivity growth after starting to export than non-exporters. However, Taiwan´s apparel and transportation equipment manufacturers and South Korean exporters from all five industries do not show any productivity growth difference with respect to non-exporters, contradicting the existence of a LBE effect.

Again, Bernard and Jensen (2004) with the same sample of US manufacturing plants but this time for the period 1983 to 1992 follow a similar empirical strategy to Bernard and Jensen (1999) to compare the productivity growth rates of groups of plants which undergo the transition pattern from non-exporters to exporters during five-year intervals. They find that new entrants into exporting experience a faster productivity growth than non-exporters in the year when they enter but after that year the productivity growth is slightly slower for continuing exporters than for non-exporters. Bernard and Jensen (2004) conclude not only that exporting *per se* is not associated with faster productivity growth rates at the plant level, but also that there is not enough evidence to support the LBE effect.

After these pioneering works more and more papers which employ firm-level datasets from different countries, for different years and with various statistical methodologies consolidate the opinion that there is mixed and unclear evidence to support the LBE effect as reported in table a21 (in annexes).

For Spain Delgado et al., (2002) with a sample of Spanish manufacturing firms for the period 1991 to 1996 examine whether or not the productivity growth for exporters is greater than the productivity growth for non-exporters. They compare the productivity growth distributions between continuous exporters from 1991 to 1996 and firms which do not export during the same time with a non-parametric approach (Kolmogorov-Smirnov tests) and find that the productivity growth is similar for exporters and non-exporters. However, for the cohort of younger firms, those firms which are five or less years old, they find that the learning effects are positive and statistically significant.

Fariñas and Martín (2007) with the same sample of Spanish manufacturing firms than Delgado et al., (2002) but for the period 1990 to 1999 and with a different statistical approach, employ a regression technique to calculate the average productivity growth difference between entering exporters and matched non-exporters, using a similar specification to Bernard and Jensen (1999) and Bernard and Jensen (2004). They authors find that there are not systematic changes in productivity between exporters and non-exporters after entry into the international market so their results do not reassert the LBE hypothesis.

García et al., (2012) with the same database for Spanish manufacturing firms again but for the period 1990 to 2002, employ a linear regression technique to test the effect of R&D intensity on the absorptive capacity of an exporter to gain new knowledge from foreign markets. They find that not all firms benefit equally from the LBE effect, with those firms with enough learning absorptive capacity benefiting more from LBE gains. García et al., (2012) results are in line with the LBE effect suggesting that exporters might benefit from knowledge spillovers in export markets, specifically those technological leaders within each industry with sufficient absorptive capacity to implement new knowledge gained from the export activity.

And Minondo (2014) with data for Spanish services sector firms for the period 2001 to 2007 compares the productivity growth between export starters and a matched group of non-exporters with a regression analysis. He finds that the difference in productivity growth, measured as labor productivity, between export starters and non-exporters is only significant during the entry year (only one period) and becomes non-significant in the following years (second and third year after starting to export). Therefore, Minondo (2014) concludes that exporters in the services sector do not enjoy significant LBE gains after starting to export.

In view that all these studies employ different testing methods, for different time periods, with different productivity measures, applied to different countries, it is difficult to dismiss the fact that the NNTT literature obtains mixed and unclear evidence on the existence of the LBE effect and some critics advocate that the degree of comparability across studies is limited and that no final conclusions regarding the LBE effect can be presented. To alleviate this problem the International Study Group on Exports and Productivity (ISGEP) develops the main effort to homogenize the testing protocol by analyzing comparable firm-level panel data from 14 countries with a common methodology to investigate the relationship between exports and productivity. To validate the LBE hypothesis ISGEP (2008) tests if the labor productivity growth for non-exporters is higher than the labor productivity growth for new exporters right after entering the export market. Out of 14 countries the group finds positive and statistically significant LBE effects only for one country (Italy), positive but non-significant effects for 12 countries and negative and significant LBE effects for China. ISGEP (2008) concludes that these results do not support the hypothesis that new exporters get a productivity boost after entering the export market and they present evidence not aligned with the LBE effect.

To cross-check all the evidence obtained by the NNTT literature on the LBE effect Wagner (2007) performs a meta-analysis of 54 empirical studies on exporting and productivity published between 1995 and 2006 with data from 34 countries to find mixed and unclear results for the LBE effect. Similar findings are reported by Martins and Yang (2009) who develop a meta-analysis of 33 studies published from 1999 until 2008 with data from 32 countries to conclude that LBE effects are only present in firms of developing countries at the beginning of their internationalization process. Again, Wagner (2012) with another meta-analysis which covers 25 studies for 11 countries published after 2006 reasserts his previous conclusion that there is mixed and unclear evidence for the LBE effect[15].

To sum up the existing literature on the LBE effect, the theoretical NNTT literature characterizes the LBE effect as a learning process through the export activity triggered by the novel challenges which a firm faces when it competes in international markets to serve foreign customers. These challenges, which take the form of stricter requirements in terms of product quality, safety standards and timely delivery, among others, crystalize into new internal abilities, products and techniques which boost the productivity of a firm. The export experience and practice, measured by cumulative exports or years as an exporter, are key to initiate, gear up and escalate the productivity improvements associated with the LBE effect.

Nevertheless, the empirical literature does not back up the LBE theoretical models, since, after more than twenty years of studies and several dozens of papers, the positive effect of exports on productivity, which has been found at a macroeconomic level and at a case-study level, becomes mixed and unclear at a firm level. The evidence does not support the hypothesis that new exporters experience a higher productivity growth than non-exporters after starting to export, since the empirical NNTT literature finds LBE effects only for some countries, for some industries, and for some firms, but often scantly. So, the debate on why some firms might learn from exporting while others do not, is still very alive.

3. Learning by exporting for micro-exporters. Are their sources negligible?

It is deeply troubling that the NNTT literature has not been able to present solid evidence on the existence of the LBE effect, given the ironclad consensus around the existence of the SS effect and the exporter premium, since papers supporting the SS effect overwhelm papers supporting the LBE

[15] The countries examined by these three papers (Wagner, 2007; Martins and Yang, 2009; and Wagner, 2012) are: Austria, Belgium, Burundi, Cameroon, Canada, Chile, China, Colombia, Cote d'Ivoire, Croatia, Cyprus, Ethiopia, Estonia, France, Germany, Ghana, Greece, Hungary, Iceland, India, Indonesia, Ireland, Italy, Japan, Kenya, Liechtenstein, Malaysia, Mexico, Morocco, Netherlands, Philippines, Portugal, Russia, Slovenia, South Korea, Spain, Sweden, Switzerland, Taiwan, Tanzania, Thailand, Turkey, United Kingdom, United States, Zambia and Zimbabwe. A fair representation of the world with undeveloped, developing and developed countries.

effect (Singh, 2010). Yet, the proposed export entry framework for small firms which become micro-exporters circumvents LBE controversies to present a plausible answer: if LBE exists, the effects on productivity are negligible among micro-exporters.

The export entry framework proposes that small firms, to cope with their low productivity levels and lack of resources, employ three complementary export entry strategies which lower the export entry cost, so they do not await to increase their productivity to be able to absorb the high export entry cost but, instead, they prefer to reduce the export entry cost to become exporters. Therefore, small firms tend to export: i) through contractual channels such as international distributors to save up the cost of creating an international distribution network, ii) to gravitational markets with similar tastes and standards to reduce expenses such as market research and product development, and iii) existing products within the firm's portfolio to save R&D costs.

Nevertheless, these three export entry strategies severely limit sales abroad to a close market, to an existing product and to a distributor network, so that small firms become micro-exporters which do not benefit significantly from the LBE effect. Figure 6 represents how the proposed export entry framework hinders small firms which become micro-exporters from obtaining significant LBE productivity gains.

First of all, as shown in figure 6, small firms which become micro-exporters prefer to employ contractual strategies to enter the international market. Contractual strategies consist of an indirect involvement to the foreign market through commercial agreements with third parties, rather than a direct involvement with the international market, because they require less financial resources, personnel, risk and time to access the export market.

Firms which employ more integrated forms of internationalization, such as direct exports instead of exports handled by international distributors, show a higher commitment to foreign operations by which firms build up more sophisticated structures and organizational capabilities. This commitment to the foreign market translates into a higher learning capacity from the international market and a faster productivity growth (Castellani, 2002). Direct exporters benefit more from the LBE effect as they engage in frequent contacts with foreign buyers, creating more opportunities to learn how to produce and what to produce than indirect exporters (Yasar, 2015; Bai et al., 2017). Through s direct participation in international markets, firms build relationships with customers and other counterparts which foster labor skills, offer new ideas, and give access to novel technologies, with a positive impact on productivity (Mengistae and Pattillo, 2004; Wu et al., 2007; Czinkota et al., 2010).

Nevertheless, by externalizing the export activity, as micro-exporters often do, firms transfer international activities such as market research, logistics, international marketing, and after-sale services to international distributors, limiting the exporter's involvement with the international market to a free on board (FOB) agreement. In most cases exporting via distributors is very similar to compete in the domestic market, and reduces potential LBE productivity gains by not developing a direct involvement with international customers and competitors, as it is the case for micro-exporters.

Secondly, as presented in figure 6, small firms with few resources frequently access gravitational markets which might share with the domestic market common standards and regulations, the same culture, currency, language, lifestyle, tastes, and belong to a common free trade agreement (FTA), to reduce the risk and cost to enter the export market.

Exporting to unfamiliar markets where economic, legal, and social structures are different from those faced in the domestic market, may really be what exposes firms to a competitive pressure and greater learning opportunities (Ruane and Sutherland, 2005; Eaton et al., 2011; Njikam, 2017). Firms exporting to relatively distant markets are more likely to experience LBE productivity gains, as they crystalize through the acquisition and implementation of new knowledge, market skills and technology to meet the requirements of international customers in terms of financial operations, labeling, language, logistics, quality, standards, etc., which are different from those required to serve the domestic market (Trofimenko, 2008; Cruz et al., 2017).

Small firms with low productivity and few resources tend to enter destinations as similar as possible to the domestic market, because it is easier for their existing products to comply with foreign standards and regulations, and be welcomed by foreign consumers. Moreover, the personnel may not need to acquire new language skills or export abilities, and the financial cost of exporting can be mitigated as they might not require to develop new products, cover the currency exchange risk, and pay non-tariff measures (NTM) to sell abroad. However, by exporting to gravitational markets, micro-exporters diminish LBE gains since they do not develop significant new internal capabilities which might crystalize into productivity improvements if the stimulus environment offered by the gravitational market is not challenging enough to trigger new market skills.

Third, as represented in figure 6, small unproductive firms tend to export their existing products to avoid the expenses and risks associated with product innovation, a cumbersome activity for most companies, moreover when they lack internal resources.

Early case studies argued that firms benefit from the export activity when international buyers, in their desire to buy products with high quality and low prices, support their foreign suppliers to produce better goods by advising them on product design, including appearance, packaging and quality control (Wortzel and Wortzel, 1981; Keesing and Lall, 1992; Evenson and Westphal, 1995; Aw and Batra, 1998; and López, 2005). An activity coined as export-related technology transfers (Westphal, 2002). This transmission of technology and blueprints from foreign customers to local exporters promotes R&D and increases product innovation and patent application (Clerides et al., 1998), generating an innovation momentum which significantly affects the firm's technological development and increases its productivity (Aw et al., 2007; Bratti and Felice, 2009; Aw et al., 2011).

Nevertheless, by selling just what they have in the portfolio, micro-exporters often do not engage in productivity enhancement activities such as quality upgrading or product design revamping. Additionally, given the small scale of micro-exporters, many international buyers do not find operational to include these firms as suppliers, and micro-exporters cannot benefit from export-related technology transfers, limiting potential gains from the LBE effect.

These three export entry strategies are not independent but highly complementary. For instance, if a Spanish firm wants to export an existing product, it is likely that a gravitational market such as Portugal is the best choice, as it shares with Spain common standards and regulations, the same currency, the European Union (EU) common market, a similar per capita income and similar tastes which welcome the product. Also, the interconnections between both countries facilitate bilateral trade flows, and it makes more likely for a Spanish firm to find a suitable distributor for the Portuguese market where the pool of distributors is ample, than finding a good distributor to sell in a faraway country.

On the one hand, the mix of these three highly complementary export entry strategies reduces to almost a negligible level the export entry cost and results in low export persistence, with quick entries and exits from the international market, and no export hysteresis. This lack of export persistence hinders the acquisition and implementation of new knowledge, and deters potential positive LBE benefits on productivity, as illustrated in figure 6.

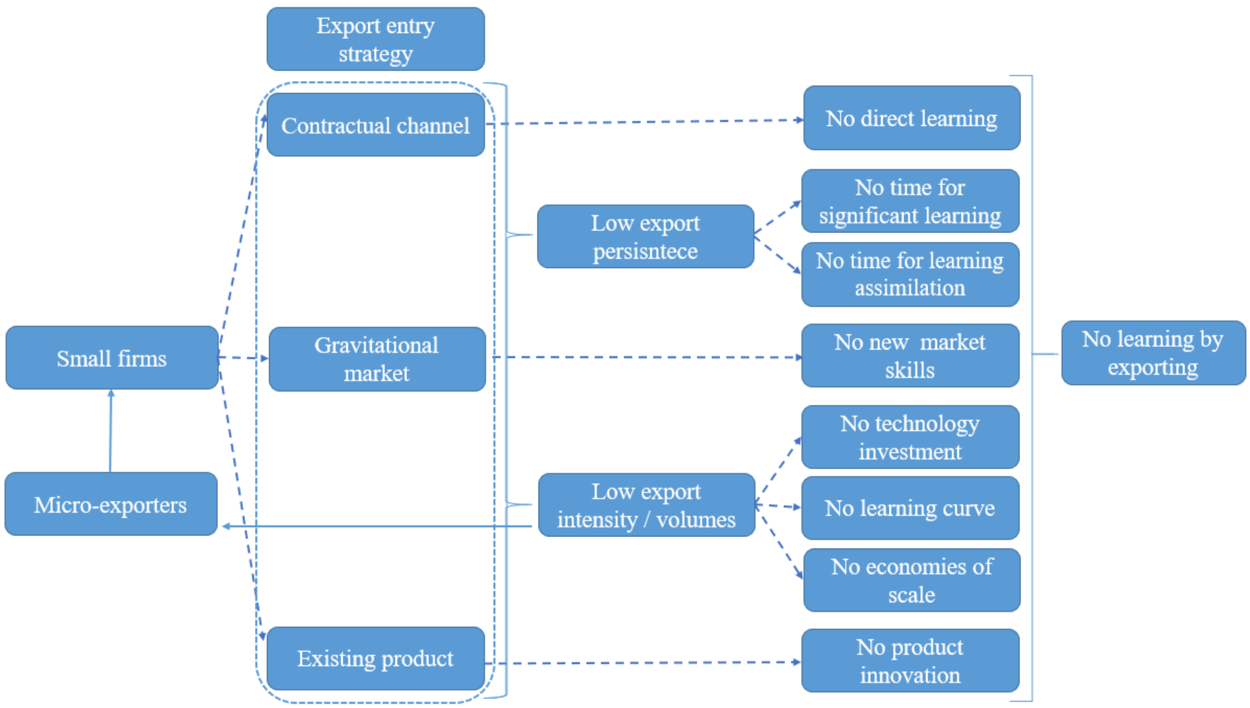
Since LBE involves a learning process from an exposure to the international market, export persistence plays a paramount role, as it takes time to assimilate the knowledge and expertise obtained through the export activity, and more time to produce observable effects on firm's productivity (Aw et at., 2007; Pisu, 2008; Andersson and Lööf, 2009). This means that temporary exporters and switchers, such as micro-exporters, might not benefit from the LBE effect, since the knowledge accumulation process does not take place within a short period of time. This suggests a role for export persistence at a firm level to produce observable LBE effects, in line with the export hysteresis literature (Manjón et al., 2013; Fernandes and Isgut, 2015).

On the other hand, the mix of these three export entry strategies also results in low exported volumes, in absolute terms (total exports), and relative terms (exports/total sales). This is, in low export intensity levels and small exports, as shown in figure 6.

Productivity-enhancing investments, such as the adoption of advanced technologies and the use of just-in-time techniques, represent large costs for many firms and, often, such investments are only justifiable with the large production volumes required to serve foreign markets (Aw et al., 2008). Some firms might not find it profitable to export because they are not productive enough, and other firms might not find it profitable to invest on cutting-edge technology because the return on investment (ROI) is not high enough, but they might find it profitable to export and invest simultaneously as complementary activities (Ekholm and Midelfart, 2005; Yeaple, 2005; Ederington and McCalman, 2008; Lileeva and Trefler, 2010). Furthermore, given the low volumes exported, no additional productivity improvements might be obtained through a rapid advance down the learning curve or during the entry year to the export market, as an effect of static factors such as economies of scale and a better capacity utilization created by the opening of new markets

(Damijan and Kostevc, 2006)[16]. The low volumes exported by micro-exporters neither encourages technology investments, nor speeds the learning curve, nor increases significantly the production capacity utilization, nor promotes larger economies of scale, as depicted in figure 6.

Figure 6. Conceptual export entry framework for small firms (micro-exporters) and the learning by exporting effect



Source: Own elaboration.

Additionally, firms with low export commitment, such as micro-exporters with low export persistence and low export intensity, often devote few internal resources to exporting, such as assigning short-term/part-time personnel or unqualified export managers, which creates an infertile ground for learning since not much is at stake in the international market (Chongvilaivan, 2012). As micro-exporters participate marginally in the international market and do not maintain a certain level of export intensity, they might not be able to benefit significantly from the LBE effect (Castellani, 2002; Fernandes and Isgut, 2015).

[16] Nevertheless, this static (one-year) effect is insufficient to explain a continuous productivity growth, accounting only for an initial surge of productivity after starting to export, which cannot be categorized as LBE. This has been called by some authors false LBE effect (Alvarez and López, 2005).

All in all, new micro-exporters, most likely, do not benefit significantly from the LBE effect because, frequently, they do not to enjoy a direct learning from the international market if they export through distributors, they do not gain new market skills by entering gravitational markets, and they do not invest in product innovation by selling abroad their existing products. As a result of the export entry strategies employed by micro-exporters, they export small amounts (low export intensity), for a short period of time (low export persistence), so they do not enjoy sufficient time to learn from the export experience, and do not obtain efficiency gains through advancing down the learning curve or from productivity enhancing investments triggered by significant production increases to serve the foreign market. Therefore, it can be concluded that micro-exporters, most likely, do not enjoy significant gains from the LBE effect, if any.

To sum up the conceptual framework on the LBE effect, the NNTT literature has identified several sources of LBE effects, such as the construction of more complex organizational structures to serve directly the foreign market, the development of new internal skills in workers and managers to cater the needs of international customers, the investment in product innovation to adapt the products to foreign requirements, the acquisition of new knowledge and technology by a continuous involvement with foreign agents, and gains in efficiency and investments in technology triggered by an increase in production to serve the larger demand created by exports.

To benefit from these sources of LBE, firms must be willing to invest personnel, time and other internal resources to learn from international customers and competitors, assimilate this knowledge, and implement it through the adoption of new products, skills and technologies with an overall positive effect on productivity as a result. However, to make up for their low productivity levels and lack of resources, small firms tend to employ export entry strategies which minimize the export entry cost, such as exporting through international distributors to spare the cost of developing a new distribution network, entering markets similar to the domestic market to reduce the market research cost and selling existing products to save money on product development and product adaptation. These export entry strategies severely limit the exported volume and it allows small firms to become micro-exporters. Owing to this, they do not benefit significantly from the LBE effect since they neither commit enough resources nor put in place major improvements in order to serve the demand created by exports, which might crystalize into positive effects on productivity.

4. Research model and variables

Once the NNTT theoretical framework on the LBE effect has been summarized, the relevant empirical literature to the LBE effect reviewed and the export entry conceptual framework for micro-exporters and its relationship with the LBE effect introduced, this section develops the research model, the hypothesis to be tested by the empirical analysis and the variables used for the investigation.

The LBE effect is defined as the, ceteris paribus, performance growth differential between new exporters and non-exporters after the new exporters enter the international market. The performance characteristic most frequently analyzed by the NNTT literature is productivity growth, so the LBE effect can be described as the higher productivity growth of new exporters compared to non-exporters after starting to export, which reflects a learning process associated with the export activity (ISGEP, 2008).

Nevertheless, if the export entry conceptual framework is correct and firms with low productivity and scarce resources become micro-exporters which are not benefited by the LBE effect there should be no productivity growth differential between new micro-exporters and non-exporters. Accordingly, the following hypothesis is proposed:

H3: New micro-exporters do not experience higher productivity growths than non-exporters after starting to export

To test that the productivity growth of new micro-exporters is no higher than the productivity growth of non-exporters after entry into exports the average difference in productivity growth from year *t-1* to subsequent periods *t*, *t+1* and *t+2* for new micro-exporters is compared to the average productivity growth for non-exporters during the same time period. The productivity growth differential is computed from a regression of log(arithmic) productivity growths on the export status dummy and a set of control variables for each firm (usually including industry and year). The result shows the average percentage growth difference in productivity between new exporters and non-exporters, after controlling for the characteristic included in the vector control (Wagner, 2012).

The proposed research model is as follows:

$$\textbf{(9)}\quad \log P_{it+n} - \log P_{it-1} = a + ß_1\, Status_{it} + ß_n\, Control_{it} + e_{it}$$

where *i* is an index for each firm, *t* is an index for the year of each observation, *P* is firm labor productivity and $\log P_{it}$ is the labor productivity logarithm for firm *i* in year *t*. Therefore, $\log P_{it+n} - \log P_{it-1}$ is the logarithmic labor productivity growth for firm *i* from year *t-1* to year *t+n*. *Status* is a dummy variable for the current export status of the firm. $Control_{it}$ is a vector of control variables for firm *i* in year *t* and *e* is an error term.

The dependent variable employed as productivity growth measure is labor productivity growth, computed as sales per worker growth and value added per worker growth, which are common dependent variables used by the NNTT literature to study the LBE effect. Some papers which employ labor productivity growth as dependent variable to study the LBE effect are Bernard and Wagner, 1997; Clerides et al., 1998; Bernard and Jensen, 1999; Wagner, 2002; Baldwin and Gu, 2003; Greenaway et al., 2005; De Loecker, 2007; ISGEP, 2008; Yang and Mallick, 2010; Ranjan and Raychaudhuri, 2011; Minondo, 2014; Vu et al., 2016; and Cruz et al., 2017, among others.

Other studies prefer to employ an alternative productivity measure known as total factor productivity (TFP), but Foster et al., (2008) show that productivity measures, such as labor productivity, which use quantity per price, and other productivity measures, such as TFP, which use only quantity, are highly correlated. This reflects the vast dispersion in firm productivity, where highly productive firms obtain high productivity levels regardless of the productivity measure, because alternative measures of productivity are highly correlated (Foster et al., 2008). Moreover, controlling for firm unobserved heterogeneity, and adding control variables such as capital intensity and industry affiliation, as in this research model, helps to control for differences between TFP and labor productivity (Fryges and Wagner, 2008).

The independent variable of interest is the export status since the hypothesis test involves checking if new micro-exporters enjoy greater productivity growths than non-exporters after starting to export, or not. The status is a dichotomous variable with value 1 if the firm does not export in year *t-1* and exports in year *t*, for both groups of new micro-exporters: new micro-exporters which do not export more than Eur 25,000/year and new micro-exporters which do not export more than Eur

50,000/year. Moreover, the variable status takes value 0 if the firm does not report any exports in year *t* and during the three preceding and posterior years, also called non-exporters.

A specific criteria is used to define new micro-exporters as firms only need to report no exports in year *t-1* and report positive exports but no higher than Eur 25,000 or Eur 50,000 in year *t* and in any other consecutive year. This distinction allows to discriminate all those companies which start to export during the final months of year *t*, so in the subsequent twelve-month period they export more than Eur 25,000 or Eur 50,000 and those companies which become large exporters but not until they have been exporting for two or more years. It is important to underscore that the Eur 25,000/year and Eur 50,000/year thresholds have been selected given the abundance of exporting firms within these export bands since, to date, there has not been any previous categorization of new micro-exporters in the relevant literature and a new parametrization standard is required.

Moreover, it is important to underscore that the selection criteria for new micro-exporters may take into account overlapping LBE effects. For instance, if a firm becomes a new micro-exporter in year *t*, stops exporting in period *t+1* and reenters the export market in year *t+2*, it creates two potential overlapping LBE effects in year *t+3*. One LBE effect from the first time the firm entered the export market in period *t* and another LBE effect from the second time the firm entered the foreign market in year *t+2*. The data employed here does not contain any cases but for companies where dipping in and out of the international market is a frequent activity overlapping LBE effects should not be discarded.

The criteria to define non-exporters comprises all those firms which do not export in year *t* and do not report any export activity during the three consecutive and posterior years (*t-3*, *t-2*, *t-1*; *t+1*, *t+2*, *t+3*) and with certainty they do not export in year *t-1*. The seven-year period is included to avoid taking into account possible lagged LBE effects, up to three years, on the productivity growth trajectory of a non-exporter. A three-year period for potential LBE effects is often used in the relevant literature (Wagner, 2002; ISGEP, 2008; Ito and Lechevalier, 2010; De Loecker, 2013). For instance, if a non-exporter is defined as a firm which does not export in year *t-1* and year *t*, it might happen that a firm does not report exports in year *t-3*, enters the export market in *t-2* and does not report exports again in *t-1* and *t*. In this situation any further productivity growth in year *t+1*, *t+2* or *t+3* might be the result of a lagged LBE effect caused by the entry into exports in year *t-2*. So, to qualify as a non-exporter the firm must report no exports in year *t* and report no exports or report no data during the three consecutive and posterior years but with certainty of no exports in year *t-1*. Non-reporting of data is caused by three main reasons: when firms have not been included in the sample yet, when firms stop collaborating with the survey and when firms cease to exist given to a closure, liquidation, change to a non-manufacturing activity and disappearance through merger or acquisition. This non-reporting criteria to define non-exporters maximizes the number of observations for non-exporters which are preserved from the original panel data into the final sample employed for testing. It retains firms which report consecutive data for only a fraction of the seven-year period without diminishing the quality of the test due to the fact that if a firm only reports data for one year or for nonconsecutive years, there is no growth parameter to be tested.

The control variables included in the model are frequently used by the NNTT literature and can be divided into two groups: initial productivity variables with moderating or negative effects on future productivity growths and absorptive capacity variables with stimulating or positive effects on future productivity growths. The initial productivity control variables included in the regression are: productivity in *t-1*, age and size. These variables show (or proxy) the initial productivity level of a firm at the time of becoming an exporter and they are expected to be negatively correlated with future growths of productivity due to the fact that high levels of initial productivity make more difficult to obtain extra productivity gains, limiting the potential productivity growth. The initial productivity control variables included in the model are:

- Productivity in *t-1*. Productivity is computed by labor productivity measured as sales per worker or value added per worker in year *t-1*. A high level of initial labor productivity can negatively affect future productivity growth rates because it shortens the firm's productivity growth potential as productivity improvements are more difficult to attain. Less productive exporters are bound to experience larger gains from LBE than high productivity exporters, which might experience no gains at all being too close to the technological frontier. Initial labor productivity is included in the model in its logarithmic form (Kraay, 1999; Castellani, 2002; Girma et al., 2004; Aw et al., 2007; Boermans, 2013; Bravo et al., 2014; Yun, 2018).

- Age. The firm age is computed as the difference between the year *t* and the birth-year reported by the firm. Age is an indicator of a survival competitive advantage in the market or a more advance position down the learning curve. In both ways (competitive advantage or learning curve) age might attenuate future productivity growth rates. Age equals 1 the year the company is born. All observations where the company does not report a birth year or reports a birth year younger than the sample year are discarded. If the company reports more than one birth year the older year is selected. This might happen in case of misreporting or a merger with an older firm. Age is included in the model in its logarithmic form (Clerides et al., 1998; Castellani, 2002; Mengistae and Pattillo, 2004; Alvarez and López, 2005; Fariñas and Martín, 2007; Haidar, 2012; Vu et al., 2016; Siba and Gebreeyesus, 2017)[17].
- Size. Size is a proxy for firm competitiveness in the market as successful firms hire more workers to sustain their expanding operations. It is also an indicator of abundant internal resources. Firms with a large workforce are more productive which has moderating effects on future productivity growth rates. Firm size is calculated as the average number of employees per year taking into account full-time personnel, part-time personnel and eventual workers, weighting part-time workers by ½ and calculating eventual workers with the quarterly workforce simple mean. Size is included in the model in its logarithmic form (Bernard and Wagner, 1997; Isgut, 2001; Bernard and Jensen, 2004; Hahn, 2005; Fariñas and Martín, 2007; García et al., 2012; Foster et al., 2014; Cruz et al., 2017; Newman et al., 2017).

The absorptive capacity control variables included in the model are: wage, capital, foreign ownership and innovation. These variables proxy for the firm abilities and capabilities to absorb new knowledge and implement it through productivity enhancing improvements. Firms might gain access to new and more advance knowledge but they need a critical mass of previous technological level and expertise to recognize the value of the new knowledge, fully realize its potential benefits and integrate it into their current operations (García et al., 2012).

[17] The control variable age in its quadric form, as per the two previous chapters, was included in the model but it was statistically non-significant and it also reduced the goodness-of-fit of the model, so age was included as a control variable but only in its linear form.

- Wage. Skilled workers with greater absorptive capacities are paid higher wages so it is expected that wage has a positive effect on future productivity growth rates. The firm wage is calculated as the yearly total labor cost per employee in euros which includes all salaries, benefits and compensations paid by the firm divided by the average number of workers during the year. Wage is included in the model in its logarithmic form (Bernard and Jensen, 1999; Clerides et al., 1998; Castellani, 2002; Greenaway et al., 2005; ISGEP, 2008; Boermans, 2013; Vu et al., 2016; Yun, 2018).
- Capital. Capital is defined as the annual value of tangible fixed assets per employee in euros or capital intensity. If workers have at their disposal better means of production it becomes easier to implement new knowledge into productivity enhancing improvements. Therefore, capital intensity positively affects future productivity growth rates. Tangible fixed assets include technical facilities, machinery, tooling, furniture, computer equipment, transport equipment and other tangible fixed assets but do not include land and buildings. The value of the tangible fixed assets is recorded from the year 1991 onwards. Capital is included in the model in its logarithmic form (Bernard and Wagner, 1997; Castellani, 2002; Baldwin and Gu, 2003; Boermans, 2013; Cruz et al., 2017; Newman et al., 2017; Yun, 2018).
- Foreign ownership. When a firm is foreign owned it can obtain technology transfers in the form of blueprints, patents, machinery and on-site technical advice from the foreign investor, positively associated with future productivity growths from knowledge flows within the firms network group. Foreign ownership is a dummy variable which indicates if there is foreign ownership in the firm's equity, with a value of 1 if the foreign ownership is higher than 0 percent of the firm's equity and a value of 0 if foreign ownership is 0 percent (Castellani, 2002; Alvarez and López, 2005; Fariñas and Martín, 2007; Love and Ganotakis, 2013; Bravo et al., 2014).
- Innovation. A higher R&D intensity than the industry average facilitates a higher absorptive capacity on new knowledge with a positive impact on future productivity growths. Besides, low-level innovators may lack some of the internal resources which allow them to absorb new knowledge and take advantage of the LBE effects. Innovation per firm is calculated as R&D intensity which is the sum of all the research and development expenditures of a company divided by its sales per year. Innovation

is a dummy variable which indicates if the firm is more innovative than the average firm in the same industrial sector *j*. The dummy variable takes value 1 if the firm *i* is more innovative than the average firm in the same industrial sector *j* in year *t* and a value of 0 otherwise (Castellani, 2002; Aw et al., 2007; Ito and Lechevalier, 2010; García et al., 2012; Bravo et al., 2014; Vu et al., 2016).

Following the standard practice of the NNTT literature an additional control variable for year and industry is included:

- Year & industry. Year includes all the years of the sampled period 1990-2015. Every year is different for the manufacturing sector as there are annual macroeconomic factors at a country level such as monetary policies (exchange rate depreciation/devaluation), fiscal policies (tax cuts/increases) and labor policies (labor incentives) which directly affect all manufacturing firm's productivity growth. Owing to this, year-to-year variations must be controlled for (Clerides et al., 1998; Aw et al., 2000; Girma et al., 2004; ISGEP, 2008; Foster et al., 2014; Siba and Gebreeyesus, 2017). Moreover, there are middle and high technology industrial sectors, such as the chemicals and pharmaceuticals industry, with higher productivity than other low technology industrial sectors such as food and tobacco. Belonging to a middle or to a high technology sector affects the firm productivity and so it must be accounted for (Bernard and Jensen, 1999; Isgut, 2001; Baldwin and Gu, 2003; Alvarez and López, 2005; Haidar, 2012; Newman et al., 2017). The combination of both factor variables (year and industry) allows to capture the potential differential effect of the economic cycle on each industry (Correa and Doménech, 2012).

Once the aforementioned variables are included the proposed research model turns as follows:

(10) $$\log P_{it+n} - \log P_{it-1} = a + ß_1 \, Status_{it} + ß_2 \log P_{it-1} + ß_3 \log Age_{it} + ß_4 \log Size_{it} + ß_5 \log Wage_{it} + ß_6 \log Capital_{it} + ß_7 \, Foreign_{it} + ß_8 \, Innovation_{it} + \sum ß_9 \, Year_t \, Industry_j + e_{it}$$

Table a22 (in annexes) includes common descriptive statistics for the variables included in the research model. It also includes extra variables such as: marketing intensity and wage per hour worked employed by the robustness checks of section 6.3.

5. Methodology and data

As reported by the seminal meta-analysis of dozens of NNTT papers elaborated by Wagner (2012) the most common approach to test the LBE effect within the NNTT literature is to employ a panel of longitudinal data for multiple firms to study differences in productivity growths between new exporters and non-exporters after exporting takes place.

The NNTT empirical literature proposes several alternative testing procedures to test the LBE hypothesis. Additionally to the already employed ordinary least squares (OLS) technique three different testing methods are explained, analyzed and compared to the OLS technique in addendum a3 (in annexes) to find the best fit to test the LBE hypothesis on new micro-exporters. After comparing the three testing methods: matching technique (Wagner, 2002), quantile regression (Yasar et al., 2006) and generalized propensity score method (GPS) (Fryges, 2009) with the OLS technique, OLS still holds as the best testing procedure to examine the LBE hypothesis on new micro-exporters, so it is finally selected to carry out the empirical analysis.

The independent variables included in the empirical model such as export status, age, capital intensity, size and wage are part of the observed firm heterogeneity as they can be detected and measured. However, firm heterogeneity might be caused by other factors which are unobservable or not observed by the researcher. Bloom and Van Reenen (2010) point out that one unobservable factor might be management quality, since they find that exporters are better managed than domestic firms but worse managed than multinationals. Unfortunately, national firm-level datasets employed by the NNTT literature do not register management quality which causes a serious problem due to the fact that management quality is most likely correlated with other variables included in the empirical model such as the already mentioned export status but also with age, capital intensity, size and wage, and not controlling for management quality will lead to biased estimates of the LBE effect by an omitted-variable bias.

Despite that many NNTT theoretical models, based on Melitz (2003) work, model differences in productivity as a result of random draws from a productivity distribution, the use of random effects to control for unobserved firm heterogeneity is not appropriate as random effects assume that the observed and unobserved variables of the empirical model are uncorrelated, an assumption that cannot be sustained. Alternatively, the NNTT literature proposes to employ firm fixed effects as the standard solution to control for time invariant unobserved firm heterogeneity (Wagner, 2016), so firm fixed effects are included in the empirical model to test the LBE hypothesis on new micro-exporters while controlling for unobserved factors which affect productivity.

Moreover, when an empirical model with many predictor variables is specified, such as the one proposed in this chapter, multicollinearity amongst the independent variables is a real possibility and it can inflate the variance amongst the variables included in the research model, creating problems to fit the model and interpret the results. Although some authors believe that there is no statistical test which can determine whether or not multicollinearity entails a problem (Schroeder et al., 1986), there are ways for detecting multicollinearity such as the variance inflation factors (VIF) (Freund et al., 2003). VIF values detect if the degree of multicollinearity among the different independent variables of the model are high enough to create serious statistical problems where, as a general rule, the values of VIF should not exceed 10. If the value of VIF exceeds 10 it is not possible to discard severe correlation problems among the independent variables (Robinson and Schumacker, 2009). The VIF values obtained for the empirical model that tests the LBE hypothesis on new micro-exporters range from 2.00 to 3.00, which confirms that the correlation among the different predictor variables is low and should not entail major problems.

The powerful finding about a sample mean, which is also the OLS estimator, is that it is the best of all possible estimators which are both linear and unbiased, which accounts for its wide use. Nevertheless, in the presence of heteroskedasticity or autocorrelation the OLS estimators, whilst still centric and consistent, they are no longer best linear unbiased estimators (BLUE). Because of this, they create a bias in the estimated standard errors which might lead to invalid inferences with a serious loss in efficiency in the OLS regression (Hill et al., 2011). After testing for groupwise heteroskedasticity (modified Wald test) and autocorrelation (Wooldridge test) the results obtained lead to reject the null hypothesis of homoscedasticity (or constant variance) and no serial correlation. To correct for this bias the regression analysis employs robust estimators to heteroskedasticity and autocorrelation.

Furthermore, when the investigation includes a sample of heterogeneous firms such as the great majority of NNTT papers and also this one, often, some observations for some firms are far away from most of the other observations in the sample, called outliers, whose values are extremely low or extremely high compared to other observed values. These extreme observations may have a great influence on the mean value of the productivity growth computed for new exporters and non-exporters and on the estimates of the LBE effect. Therefore, conclusions about the differences in productivity growth between micro-exporters and non-exporters might be influenced by a small number of firms with extremely high or low values. Taking into account that national firm-level databases do not allow further investigation on single observations due to confidentiality to detect and correct reporting errors or to understand the idiosyncratic events which lead to extreme values, applying robust estimators with fixed effects for panel data models has been proposed as a solution to deal with outliers and unobserved firm heterogeneity (Wagner, 2016). Due to the fact that the data employed for testing includes several hundreds of heterogeneous firms, robust estimators with fixed effects are incorporated to the empirical analysis to strengthen the OLS regression applied on the research model, as well as to control for outliers and for the unobserved firm heterogeneity.

To alleviate the large-firm overrepresentation problem which biases firm-level national statistical databases the analysis focus on the specific data concerning new micro-exporters and non-exporters. By focusing the analysis on micro-exporters' data it can be expected that the results obtained conform better to their specific reality supported by an export entry conceptual framework which allows to explain why firm heterogeneity crystalizes into different export entry patterns which render different results such as the existence or not of the LBE effect, setting apart micro-exporters from other exporters. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded.

The data comes from the already employed *Encuesta sobre Estrategias Empresariales* (ESEE), the Survey on Business Strategies, which covers Spanish manufacturing firms for the period 1990 to 2015, described in more detail in Chapter I, section 5. The ESEE is the firm-level database most frequently used to test the LBE effect in Spanish and some empirical papers on the Spanish economy previously mentioned in this chapter such as Delgado et al., 2002; Fariñas and Martín, 2007; ISGEP, 2008; García et al., 2012; and Manjón et al., 2013 use the ESEE and also others such as Máñez et al., (2010) who find evidence of LBE effects for small and large firms but with different time patterns and Avella and García (2010) who test the LBE hypothesis on Spanish small and medium enterprises (SME) to report that the effect on labor productivity is positive but not significant or negative and statistically significant.

The ESEE contains an unbalanced panel of 183 new micro-exporters which do not export more than Eur 25,000/year and 290 new micro-exporters which do not export more than Eur 50,000/year as shown in table 18. Due to the fact that new micro-exporters are defined as firms that do not export in year *t-1* and start to export in year *t*, the first year of the sample 1990 does not contain any new micro-exporter as it is not possible to know their previous export status in 1989. Therefore, in the sample the first *t-1* year is 1990 and the first *t* year is 1991, creating the first wave of new micro-exporters in the year 1991. The ESEE database also contains an average of 465 non-exporting firms per year and given that non-exporters are defined as firms which do not export in year *t-1* and also do not export in year *t*, the first year of the sample 1990 does not contain any non-exporter.

Table 18. Number of new micro-exporters and non-exporters sampled by the ESEE database per year, period 1990-2015

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
New micro-exporters <= €25,000/year	-	10	9	6	9	8	3	8	8
New micro-exporters <= €50,000/year	-	18	16	12	16	14	5	12	13
Non-exporters	-	719	655	587	555	484	442	433	483
Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
New micro-exporters <= €25,000/year	6	5	7	6	3	4	3	8	10
New micro-exporters <= € 50,000/year	12	10	10	10	6	5	5	10	17
Non-exporters	433	443	449	449	370	365	350	493	586
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	
New micro-exporters <= €25,000/year	7	4	11	11	11	9	7	10	
New micro-exporters <= €50,000/year	10	8	16	15	14	12	10	14	
Non-exporters	531	476	469	439	365	382	348	320	

Source: Own elaboration with unbalanced panel data from the ESEE database for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Additionally, the ESEE includes 20 two-digit Spanish manufacturing industrial sectors *j* defined by the *Clasificación Nacional de Actividades Económicas* (CNAE), the National Classification of Economic Activities, following its latest update in 2009. Applying the standard procedure within the NNTT, monetary values in euros have been deflated by the *Índice de Precios Industriales* (IPRI), the Industrial Price Index for the Spanish manufacturing sector, base year 2010, to be expressed in constant values and eliminate biases due to inflation. This deflation index includes different index numbers per year for each of the 20 industries *j* to account for differences in the inflation rate among industrial sectors.

6. Results

6.1. Descriptive analysis

A descriptive analysis of the ESEE data shows that new micro-exporters have low export commitment, measured as export persistence and export intensity, to possibly gain significant productivity boosts from the LBE effect. Table 19 illustrates that new micro-exporters have low export persistence measured by the number of consecutive years that they export before exiting the international market. Less than half of all new micro-exporters remain exporting after the entry year, and very few keep on exporting after three consecutive years. LBE takes time, but more than half of all new micro-exporters exit the export market in less than twelve months, with no time to assimilate and implement the new knowledge gained from foreign agents. However, this is not the case for large exporters, where almost half of them keep on exporting three years after starting to export.

Furthermore, the data on table 19 is also aligned with the proposition that new micro-exporters experience quick entries and exits from the international market with, apparently, no export hysteresis. If firms can access the international market with low entry barriers this, in turn, might imply that internationalization occurs more readily and with less persistence (Love and Ganotakis, 2013).

Table 19. Average export persistence for different export status groups of new exporters, period 1990-2015

Export persistence	New micro-exporters <= €25,000	New micro-exporters <= €50,000	All new exporters	New large exporters > €25,000	New large exporters > €50,000
No. new exporters	183	290	1,249	1,066	959
Remain after 1 year	75	142	859	784	717
% after 1 year	41%	49%	69%	74%	75%
Remain after 2 years	37	80	652	615	572
% after 2 years	20%	28%	52%	58%	60%
Remain after 3 years	17	43	512	495	469
% after 3 years	9%	15%	41%	46%	49%

Source: Own elaboration with unbalanced panel data from the ESEE database for the period 1990-2015. If a new exporter reports no exports or reports no data in a period after entering the export market, it is considered that it exits the export market. No data indicates that the firm ceases to exist or that the firm stops collaborating with the survey. In the second case the firm might keep on exporting, so the export persistence reported in the table can be overestimated. If no data is considered as a positive prove of exporting, then 34 percent of new micro-exporters exit the export market during the entry year. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Table 20 shows that new micro-exporters have low export intensity too, measured as the percentage of exports divided by their sales per year. The export intensity of new micro-exporters, even three years after starting to export, is lower than 1.5 percent. LBE requires commitment to the international market, but the volume exported by new micro-exporters represents a trivial fraction of their businesses, so the export activity does not create sufficient exposure to foreign agents to assimilate new ideas and technologies. However, for new large exporters the stakes are higher in the international market, due to the fact that the export intensity of new large exporters ranges between 9 and 14 percent during the first three years in the international market. It seems that new micro-exporters do not enjoy an adequate mix of export persistence and export intensity to benefit significantly from the LBE effect.

Table 20 also shows that new micro-exporters have low export intensity levels, which tend to decrease with tenure in the international market, while new large exporters become more export-oriented as their international experience increases. This can be explained by a Darwinian mechanism that forces out of the export market those firms with low export intensity (and low productivity) in favor of more export-oriented companies (Melitz, 2003).

Table 20. Average percentage of export intensity for different export status groups of new exporters, period 1990-2015

Export intensity	New micro-exporters <= €25,000	New micro-exporters <= €50,000	All new exporters	New large exporters > €25,000	New large exporters > €50,000
Export intensity entry year (%)	0.99	1.34	7.70	8.86	9.63
Export intensity 2nd year (%)	0.79	1.26	9.70	10.55	11.37
Export intensity 3rd year (%)	0.71	1.40	11.58	12.23	13.00
Export intensity 4th year (%)	0.69	1.20	13.12	13.54	14.21

Source: Own elaboration with data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Overall, the ESEE data is aligned with the export entry conceptual framework where new micro-exporters have infrequent contacts (low export persistence), with a limited number of foreign agents (low export intensity), leading to a limited flow of knowledge and ideas from foreign parties which cannot crystalize into significant productivity boosts obtained from the LBE effect.

A descriptive analysis of twelve firm performance characteristics, plus age, often used by the NNTT literature such as in Bernard and Jensen, 1995; Bernard and Wagner, 1997; Girma et al., 2004; Arnold and Hussinger, 2005; Hahn, 2005; Fariñas and Martín, 2007; Yang and Mallick, 2010; Temouri et al., 2013; and Njikam, 2017, supports the hypothesis that new micro-exporters do not experience higher increases in performance, and more specifically higher productivity growths, than non-exporters after starting to export, thanks to the LBE effect. The absence of performance improvements is shown by the lack of clear growth trajectories in most of the parameters analyzed for new micro-exporters, such as the number of employees, capital intensity, wages, labor productivity and innovation intensity, during the entry year and the next three years after starting to export.

Analyzing the five-year period performance evolution of new micro-exporters, as illustrated in table 21, it is not possible to state that starting to export increases firm performance or productivity. For new micro-exporters which do not export more than Eur 25,000/year, comparing their performance values during the year before starting to export *t-1*, with their evolution after starting to export in year *t* and subsequent years *t+1*, *t+2* and *t+3* (no matter if they keep on exporting or exit the market), the growth trajectory is ambiguous, at best.

Table 21 shows that only three performance indicators have a positive evolution after starting to export: marketing intensity, capital per worker and sales. While two indicators have a positive but quasi stagnant evolution: wage per worker and wage per hour worked. Four indicators follow a negative but quasi stagnant path: sales per worker, sales per hour worked, value added per worker, and value added per hour worked. And three performance indicators have a negative evolution over time: number of employees, innovation intensity and foreign investment in the firm's equity. Note that all four parameters which measure labor productivity follow a negative but quasi stagnant path, defining stagnant path as a five-year period variation (from *t-1* to *t+3*), as well as an average year-to-year variation for the whole period, both smaller than 3 percent.

Table 21. Performance characteristics averages for five consecutive years for a group of new micro-exporters, period 1990-2015 (constant values in euros)

Firm performance characteristic	New micro-exporters <= €25,000				
	Year t-1	Year t	Year t+1	Year t+2	Year t+3
Employees (size)	29	30	29	29	28
R&D/sales	0.44%	0.21%	0.20%	0.16%	0.10%
Marketing/sales	0.67%	0.80%	0.76%	0.80%	1.00%
Capital/ worker	43,104	42,651	42,569	44,274	48,283
Sales	3.66e+06	3.93e+06	3.74e+06	4.16e+06	4.28e+06
Sales/worker	84,461	84,008	84,451	85,513	82,940
Sales/hour	48.01	47.42	47.78	48.12	46.76
Wage/ worker	23,928	24,249	23,783	24,488	24,533
Wage/hour	13.72	13.83	13.55	14.09	14.07
VA/worker	31,736	32,777	31,737	31,461	31,177
VA/hour	17.98	18.59	18.01	17.80	17.57
Foreign	0.26%	0.27%	0.00%	0.00%	0.00%
Age	20	21	21	22	23
No. firms	183	183	146	116	100

Source: Own elaboration with unbalanced panel data from the ESEE database for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. No. firms refers to the number of new micro-exporters in the sample, which decrease every period after *t* since firms exit the sample.

Additionally, performing a t-test with the twelve firm performance characteristics displayed in table 21, there are no statistically significant differences in the mean value of each performance indicator from year to year, and for the whole five-year period, except for the variable marketing intensity from *t-1* to *t+3*. Therefore, the ESEE data is aligned with the absence of significant LBE effects for micro-exporters after starting to export.

Analyzing the five-year period evolution for all new micro-exporters which do not export more than Eur 50,000/year, the big picture is quite similar, as illustrated in table 22. According to table 22, there are only two performance indicators which have a positive evolution after starting to export: marketing intensity and capital intensity. While two indicators follow a positive but quasi stagnant path: wage per worker and wage per hour worked. And eight performance indicators, the majority, have a negative evolution over time: size, innovation intensity, sales, sales per hour worked, sales per worker, value added per worker, value added per hour worked, and foreign investment in the firm's equity. More importantly, all four labor productivity indicators follow a negative path over time.

Table 22. Performance characteristics averages for five consecutive years for a group of new micro-exporters, period 1990-2015 (constant values in euros)

Firm performance characteristic	New micro-exporters <= €50,000				
	Year t-1	Year t	Year t+1	Year t+2	Year t+3
Employees (size)	30	31	30	29	28
R&D/sales	0.34%	0.23%	0.19%	0.18%	0.26%
Marketing/sales	0.65%	0.72%	0.69%	0.69%	0.76%
Capital/ worker	42,249	43,618	45,859	49,151	46,507
Sales	3.67e+06	3.88e+06	3.80e+06	3.80e+06	3.48e+06
Sales/worker	100,355	101,561	105,498	91,291	84,787
Sales/hour	57.48	57.28	59.65	51.35	48.02
Wage/ worker	23,760	24,022	24,120	23,975	24,170
Wage/hour	13.50	13.63	13.72	13.75	13.83
VA/ worker	33,697	34,130	33,867	31,517	30,678
VA/hour	18.91	19.20	19.12	17.90	17.37
Foreign	0.34%	0.79%	0.74%	0.00%	0.00%
Age	20	21	22	23	24
No. firms	290	290	241	194	166

Source: Own elaboration with data from the ESEE. All values are calculated on a year basis and monetary values are expressed in euros. Data in constant values deflated by the IPRI, base year 2010. No. firms refers to the number of new micro-exporters included in the ESEE, which decrease every period after *t* since firms exit the sample.

Performing a t-test with the twelve firm performance characteristics included in table 22, there are no statistically significant differences in the mean value of each performance indicator from year to year and for the whole five-year period. Micro-exporters do not seem to obtain significant LBE performance gains from exporting.

It might be argued that some firm performance indicators do not have a negative evolution over time and that, instead, they follow an unclear or stagnant path, or even that they might have a positive (if marginal) evolution during the five-year period. However, from the data examined, it is distinct that there is not a clear relationship between starting to export and an improvement in firm performance or firm productivity for new micro-exporters, particularly if productivity is measured as labor productivity by sales per worker or per hour worked and by value added per worker or per hour worked.

The data contained in the ESEE, for the period 1990 to 2015, is in line with the export entry conceptual framework for small firms which become micro-exporters. The results obtained give support to the prediction that new micro-exporters, after starting to export, do not experience significant productivity boosts, and endorse the hypothesis that new micro-exporters do not enjoy significant higher productivity growths than non-exporters, gained through the LBE effect. However, LBE testing requires to perform a comparison between new micro-exporters and non-exporters, so a descriptive analysis for new micro-exporters' data alone does not suffice. Besides, there is a great deal of heterogeneity among industrial sectors and firms, so a thorough econometric analysis is required to identify and isolate all other factors which might be polluting the comparison between new micro-exporters and non-exporters.

6.2. Empirical results

With an unbalanced panel data from the ESEE database for the period 1990-2015, running a robust regression with fixed effects for new micro-exporters which do not export more than Eur 25,000/year compared to non-exporters and sales per worker growth as the dependent variable, the results obtained are included in table 23.

As shown in table 23, the variable status is negative but not statistically significant the entry year *t*, and positive but not significant the next three years (*t+1*, *t+2* and *t+3*). This result indicates that the productivity growth of new micro-exporters after starting to export does not differ significantly from the productivity growth of non-exporters. Starting to export does not seem to confer any productivity growth advantage to new micro-exporters against non-exporters, supporting the hypothesis that new micro-exporters do not experience higher productivity growths than non-exporters. There appears to be no significant LBE effects for new micro-exporters, even in the long term (three years after starting to export from *t-1* to *t+3*).

Table 23. OLS robust regression with fixed effects for the LBE effect, dependent variable sales per worker growth with new micro-exporters

Variable	New micro-exporters <= €25,000			
	LBE year t	**LBE year t+1**	**LBE year t+2**	**LBE year t+3**
Status $_t$	-.013	.018	.033	.068
	(-0.50)	(0.53)	(0.76)	(1.50)
Productivity $_{t-1}$	-.558***	-.722***	-.812***	-.891***
	(-21.35)	(-25.00)	(-27.85)	(-35.51)
Age $_t$	-.064**	-.074*	-.101**	-.112**
	(-2.21)	(-1.90)	(-2.12)	(-2.07)
Size $_t$	-.091***	-.058**	-.032	-.014
	(-4.40)	(-2.40)	(-1.27)	(-0.50)
Wage $_t$	.404***	.129***	.031	.019
	(14.66)	(3.77)	(0.88)	(0.46)
Capital $_t$	.037***	.019*	.012	-.001
	(4.38)	(1.78)	(0.99)	(-0.04)
Foreign $_t$	.024	-.006	-.023	-.077
	(0.53)	(-0.10)	(-0.33)	(-0.92)
Innovation $_t$	.066**	.071**	.067*	.091*
	(2.45)	(2.48)	(1.85)	(1.95)
Constant	2.310***	6.773***	8.931***	10.062***
	(6.18)	(13.56)	(19.51)	(20.47)
Year and industry effect	Included	Included	Included	Included
N	1,842	1,640	1,433	1,211
Observations	11,475	9,900	8,536	7,392
Adj. R squared	0.3386	0.4331	0.5183	0.5934

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

The productivity level in *t-1* (the year before starting to export), the age of the firm and the size of the firm in year *t*, as expected, have a negative and significant effect on future productivity growths, indicating that the productivity evolution of a firm is partly constrained by its initial productivity level as illustrated in table 23. Therefore, the productivity boost from exporting is highly influenced by the firm's initial productivity level (De Loecker, 2013). The number of employees (size) has a negative effect in all periods, but with gradual diminishing effects on future productivity variations, to become non-significant after year *t+1*. This might be explained because the control variable size can vary significantly faster over time when compared to age and labor productivity.

The absorptive capacity control variables wage, capital intensity and innovation intensity, included in table 23, as expected, have a positive and statistically significant effect (at least for the first two years *t* and *t+1*), suggesting that firms with more internal capabilities and resources tend to experience a faster evolution of their productivity over time. Therefore, firms with higher absorptive capacity of new knowledge stand to benefit more from the LBE effect (García et al., 2012). However, wage and capital intensity have gradual diminishing effects on future productivity variations, to become non-significant after year *t+1*, so their predictive power reduces over time.

The results for the absorptive capacity control variable foreign investment are confusing, with a positive but non-significant effect during the entry year *t*, and negative but non-significant effect on subsequent years (*t+1*, *t+2* and *t+3*). This might be explained by the fact that very few small firms (micro-exporters and non-exporters) have significant foreign investment in their equity. Owing to this, the results are non-significant. Moreover, the relevant literature points to a positive effect of foreign investment on productivity through transfers of licenses, blueprints and technical advice when the local company becomes a supplier of the foreign counterpart because, in exchange, the local firm supplies better quality products at a lower cost (López, 2005). Nevertheless, non-exporters and micro-exporters do not receive foreign investments to become suppliers and the benefits of knowledge transfers from a foreign counterpart are not at play.

With the same unbalanced panel data for the period 1990-2015, running the same robust regression with fixed effects and sales per worker growth as the dependent variable, for new micro-exporters which do not export more than Eur 50,000/year and non-exporters, the results are quite similar as shown in table 24. The new regression strongly reinforces the previous result. The independent variable status becomes positive for all periods (*t*, *t+1*, *t+2* and *t+3*), but remains non-significant, supporting the validity of the hypothesis that new micro-exporters do not enjoy faster productivity growths than non-exporters, gained from the LBE effect when they start to export, as the export entry conceptual framework for new micro-exporters suggests. Also, for all the seven control variables included in the new regression, there are no significant changes compared to the previous test, defining significant change as a deviation higher than 1 percent in the estimator value which measures the control variable effect on labor productivity.

Table 24. OLS robust regression with fixed effects for the LBE effect, dependent variable sales per worker growth with new micro-exporters

Variable	New micro-exporters <= €50,000			
	LBE year t	**LBE year t+1**	**LBE year t+2**	**LBE year t+3**
Status $_t$	.016	.038	.019	.025
	(0.71)	(1.27)	(0.51)	(0.60)
Productivity $_{t-1}$	-.555***	-.718***	-.808***	-.890***
	(-21.40)	(-25.11)	(-27.87)	(-35.28)
Age $_t$	-.063**	-.072*	-.098**	-.104*
	(-2.19)	(-1.87)	(-2.09)	(-1.94)
Size $_t$	-.090***	-.056**	-.030	-.013
	(-4.37)	(-2.37)	(-1.21)	(-0.47)
Wage $_t$	.402***	.131***	.033	.021
	(14.69)	(3.87)	(0.94)	(0.50)
Capital $_t$	.038***	.019*	.013	-.001
	(4.47)	(1.85)	(1.08)	(-0.05)
Foreign $_t$	.025	-.004	-.028	-.085
	(0.55)	(-0.07)	(-0.39)	(-0.98)
Innovation $_t$	.066**	.071**	.068*	.094**
	(2.46)	(2.47)	(1.84)	(1.98)
Constant	2.291***	7.088***	9.059***	9.801***
	(6.19)	(13.08)	(19.50)	(18.83)
Year and industry effect	Included	Included	Included	Included
N	1,891	1,687	1,470	1,241
Observations	11,580	9,994	8,612	7,456
Adj. R squared	0.3371	0.4309	0.5166	0.5919

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Changing the dependent variable sales per worker growth, which measures labor productivity growth, to value added per worker growth and running a robust regression with fixed effects for new micro-exporters which do not export more than Eur 25,000/year versus non-exporters, the results are included in table 25. Again, the data in table 25 shows that the independent variable status is non-significant in every period, supporting the hypothesis that new micro-exporters do not experience faster productivity growths compared to non-exporters after entry into exports, as predicted by the conceptual framework.

Table 25. OLS robust regression with fixed effects for the LBE effect, dependent variable value added per worker growth with new micro-exporters

Variable	New micro-exporters <= €25,000			
	LBE year t	**LBE year t+1**	**LBE year t+2**	**LBE year t+3**
Status $_t$	.038	-.023	.101	.085
	(0.70)	(-0.37)	(1.49)	(1.32)
Productivity $_{t-1}$	-.891***	-.999***	-1.003***	-1.016***
	(-40.29)	(-52.88)	(-45.93)	(-49.86)
Age $_t$	-.029	-.002	.022	-.006
	(-0.78)	(-0.04)	(0.42)	(-0.10)
Size $_t$	.007	.045	.028	.049
	(0.28)	(1.52)	(0.94)	(1.48)
Wage $_t$	.716 ***	.314***	.145***	.082*
	(15.37)	(6.73)	(3.09)	(1.74)
Capital $_t$	.030*	.016	.005	-.001
	(1.91)	(1.07)	(0.41)	(-0.06)
Foreign $_t$	-.082	-.022	-.022	-.133**
	(-1.42)	(-0.31)	(-0.31)	(-2.07)
Innovation $_t$	-.014	.021	.024	.040
	(-0.32)	(0.52)	(0.51)	(0.77)
Constant	2.353***	6.829***	8.582***	9.152***
	(4.21)	(13.01)	(15.92)	(16.65)
Year and industry effect	Included	Included	Included	Included
N	1,826	1,618	1,405	1,190
Observations	11,211	9,640	8,293	7,181
Adj. R squared	0.4381	0.4776	0.5044	0.5266

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

The control variable productivity in *t-1*, as expected, has a negative and significant effect on future productivity growths, suggesting that the productivity evolution of a firm is partly constrained by its initial productivity level. Besides, the absorptive capacity control variable wage becomes more significant in every period, reinforcing the idea that firms with more internal capabilities and resources tend to experience a faster evolution of their productivity over time. Nevertheless, all the other five control variables included in table 25 become almost non-significant. Meaning that they are better predictors of the evolution of future sales growths than predictors of the evolution of future sales margins growths.

Running the same robust regression with value added per worker growth as dependent variable and new micro-exporters which never export more than Eur 50,000/year versus non-exporters, the results are fairly similar as shown in table 26. Again, there is no evidence of a LBE effect on new micro-exporters. As predicted by the conceptual framework, the values of the variable status included in table 26, which shows the labor productivity growth difference among new micro-exporters and non-exporters after starting to export, are positive but not statistically significant in every period (*t*, *t+1*, *t+2* and *t+3*), supporting the hypothesis that new micro-exporters do not experience higher productivity growths compared to non-exporters after starting to export.

Additionally, for all the seven control variables included in table 26, the are no significant changes with the previous tests, defining significant change as a deviation higher than 1 percent in the estimator value, this is, the variable effect on labor productivity[18].

In all four regressions, from table 23 to table 26, the combined factor variable year and industry employed is relevant after performing a joint significance test. Moreover, the goodness-of-fit of the linear model, measured as adjusted R-squared, increases in all periods (*t*, *t+1*, *t+2* and *t+3*) when the combined factor variable is included. Besides, the goodness-of-fit is higher in all periods when the combined factor variable is included, compared to the regression which includes both factor variables (year and industry) but not combined.

[18] There are two exceptions, age in year *t+3* with an effect 1.8 percent higher and foreign in year *t+3* with an effect 1.3 percent lower. As they do not represent significant deviations from previous results, these variations are not analyzed in further detail.

Table 26. OLS robust regression with fixed effects for the LBE effect, dependent variable value added per worker growth with new micro-exporters

Variable	New micro-exporters <= €50,000			
	LBE year t	LBE year t+1	LBE year t+2	LBE year t+3
Status $_t$	.027	.011	.083	.048
	(0.59)	(0.22)	(1.57)	(0.92)
Productivity $_{t-1}$	-.890***	-.999***	-1.002***	-1.015***
	(-40.70)	(-53.02)	(-46.06)	(-49.76)
Age $_t$	-.026	.002	.021	.007
	(-0.72)	(0.04)	(0.43)	(0.12)
Size $_t$	.007	.046	.029	.048
	(0.26)	(1.55)	(1.00)	(1.48)
Wage $_t$	.718***	.324***	.150***	.081*
	(15.47)	(6.95)	(3.21)	(1.72)
Capital $_t$	.028*	.012	.007	-.001
	(1.84)	(0.85)	(0.57)	(-0.09)
Foreign $_t$	-.082	-.017	-.025	-.146**
	(-1.44)	(-0.24)	(-0.36)	(-2.22)
Innovation $_t$	-.015	.022	.023	.046
	(-0.33)	(0.54)	(0.50)	(0.89)
Constant	2.335***	6.771***	8.479***	9.109***
	(4.21)	(12.94)	(15.91)	(16.55)
Year and industry effect	Included	Included	Included	Included
N	1,874	1,666	1,441	1,218
Observations	11,314	9,733	8,367	7,242
Adj. R squared	0.4357	0.4780	0.5034	0.5272

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a23 and table a24 (in annexes) show the correlation matrix for the variables included in the research model during the entry year (*t-1* to *t*), for the group of new micro-exporters which do not export more than Eur 50,000/year, since this group subsumes the group of new micro-exporters which do not export more than Eur 25,000/year. It is worth mentioning that few variables show a high degree or correlation (higher than 0.500). When the dependent variable labor productivity growth is measured as sales per worker growth, there are two correlations higher than 0.500: productivity in year *t-1* and wage (0.6), and productivity in year *t-1* and capital intensity (0.5). When the dependent variable labor productivity growth is measured as valued added per worker growth, the only correlation higher than 0.500 is productivity in year *t-1* and wage (0.6). The correlations have been done for every other time interval (*t-1* to *t+1*, *t-1* to *t+2* and *t-1* to *t+3*) and for micro-exporters which do not export more than Eur 25,000/year, with consistent results.

To sum up, the results obtained from the descriptive statistics analysis and from the regression tests support the proposition presented in the conceptual framework, by which new micro-exporters do not experience faster productivity growths than non-exporters after starting to export, sustaining the hypothesis that new micro-exporters do not enjoy significant gains from the LBE effect as the export entry conceptual framework suggests. The absence of LBE gains, even three years after starting to export, might be explained by the low levels of internal resources and capabilities of new micro-exporters to absorb and benefit from new knowledge, despite the high potential for growth that their relative low levels of initial productivity generate.

Nevertheless, some authors point out that in any comparison among groups of heterogeneous firms, testing for differences only with unconditional mean values (descriptive analysis), and conditional mean values (regression with control variables), does not suffice. Empirical studies of heterogeneous firms should also look at differences in the whole distribution of the variable under investigation between groups of firms, and not only at differences at the mean (Buchinsky, 1994; Wagner, 2016). To this end, a non-parametric test is performed, following the formulation of Delgado et al., (2002) as included in addendum a4 (in annexes). The results reassert the previous conclusion that new micro-exporters do not experience higher productivity growths than non-exporters after starting to export, as shown by the graphical comparison of the labor productivity growth distribution functions for both groups of new micro-exporters in figure a9 to figure a12 (in annexes).

6.3. Robustness checks

To check the robustness of the results obtained by the previous regression analyses, three different robustness checks are performed.

The first robustness check replaces the innovation control variable for a marketing control variable, where marketing is a dummy variable which indicates if the firm is more marketing intensive than the average firm in the same industrial sector *j*. Marketing intensity per firm is calculated as the sum of all the marketing expenses of a company divided by its total sales per year. These marketing costs include advertising, promotion and public relations. The dummy variable takes value 1 if the firm *i* is more marketing intensive than the average firm in the same industry sector *j* in year *t* and a value of 0 otherwise. A higher marketing intensity might indicate a superior absorptive capacity and therefore it is expected to have a positive impact on future productivity growths (García et al., 2012). Replacing the innovation control variable for a marketing control variable the research model can be rewritten as:

(11) $\log P_{it+n} - \log P_{it-1} = a + ß_1 \text{ Status}_{it} + ß_2 \log P_{it-1} + ß_3 \log \text{Age}_{it} + ß_4 \log \text{Size}_{it} + ß_5 \log \text{Wage}_{it} + ß_6 \log \text{Capital}_{it} + ß_7 \text{ Foreign}_{it} + ß_8 \text{ Marketing}_{it} + \sum ß_9 \text{ Year}_t \text{ Industry}_j + e_{it}$

The previous results are highly consistent to this robustness check a shown in table a25 to table a28 (in annexes), where the variables and the constant do not experience any relevant changes in their estimators or their significance levels, except for the control variable marketing which is replacing innovation. When the dependent variable is productivity growth measured as sales per employee growth, the variable marketing becomes slightly less significant than innovation, but still remains positive and significant in most of the periods for both groups of new micro-exporters. When the dependent variable is productivity growth measured as value added per employee growth, marketing becomes slightly more significant than innovation, but it is still positive and non-significant almost all the periods for both groups of new micro-exporters.

The second robustness check enlarges the criterium to select non-exporters. Up to this point a non-exporter is defined as a firm which does not export in year *t*, and does not report any export activity during three consecutive and posterior years (*t-3*, *t-2*, *t-1*; *t+1*, *t+2*, *t+3*), and with certainty it does not export in year *t-1*. The seven-year period is included to avoid taking into account possible lagged LBE effects, up to three years, on the productivity growth trajectory of a non-exporter. However, it can be argued that the seven-year period is too long and arbitrary, so a five-year period is employed in this robustness check as in Hahn (2005). This new criteria increases by 8 percent the number of firms which classify as non-exporters, as firms only need to report no exports in year *t* and report no export activity during the two consecutive previous and posterior years (*t-2*, *t-1*, *t+1*, *t+2*), but with certainty of no exports in year *t-1*.

With this new definition of non-exporters, the previous results are highly consistent to this robustness check. As shown in table a29 to table a32 (in annexes), most of the independent variables do not experience major changes in their estimators or their significance levels. When the dependent variable is sales per worker growth, for both groups of new micro-exporters only the variable export status experiences a change greater than 2 percent. And when the dependent variable is measured as value added per worker growth, the variables foreign and innovation also experience relevant changes. Nevertheless, their estimators remain statistically non-significant for both groups of new micro-exporters. More importantly, the explanatory variable status remains statistically non-significant for both groups of new micro-exporters, and for every period (*t*, *t+1* and *t+2*). Again, there is no evidence for the LBE effect on micro-exporters. All in all, this test have slightly more predictive power, since the goodness-of-fit of the linear model measured as adjusted R-squared increases for most of the periods (*t*, *t+1*, *t+2*).

The third robustness check changes the variable wage per worker for the variable wage per hour worked, calculated as the yearly total labor cost per employee in euros, which includes all salaries, benefits and compensations, paid by the firm, divided by the yearly effective hours of work as per Fariñas and Martín (2007). Yearly effective hours of work is calculated as the sum of the normal work hours plus the overtime minus the non-worked hours.

Given the high correlation between wage per worker and wage per hour worked, it is not surprising to obtain highly consistent results as shown in table a33 to table a36 (in annexes). When the dependent variable is sales per worker growth for both groups of new micro-exporters, only the variable wage per hour worked experiences a relevant change, reducing its effect on the productivity growth by about 7 percent in year *t*, 4 percent in year *t+1*, 2 percent in year *t+2*, and 0.2 percent in year *t+3*. And, when the dependent variable is value added per worker growth, again, for both groups of new micro-exporters, only the variable wage per hour worked experiences a relevant change reducing its effect on productivity growth by about 10 percent in year *t*, 6 percent in year *t+1*, 3 percent on *t+2*, and 0.8 percent in year *t+3*. Again, the results are in line with the export entry conceptual framework for small firms with low productivity and few resources which become micro-exporters, and with the hypothesis that micro-exporters do not benefit significantly from the LBE effect, since the variable status is non-significant for any group of new micro-exporters. The substitution of the variable wage per worker for the variable wage per hour worked does not increase the predictive power, since the goodness-of-fit of the linear model measured as adjusted R-squared does not increase for any period (*t*, *t+1*, *t+2*, *t+3*).

To sum up the empirical results, the descriptive analysis of several firm performance characteristics does not reveal significant improvements in firm performance for new micro-exporters after starting to export and, often, it shows negative evolution paths. The data from the ESEE is aligned with the proposition that new micro-exporters do not enjoy significant gains from the LBE effect. This conclusion is supported by the low levels of export commitment of new micro-exporters, where half of them exit the export market during the entry year (no export persistence), and whose exported volumes are lower than 1.5 percent of their sales (no export intensity).

The hypothesis that new micro-exporters do not experience higher productivity growths compared to non-exporters after they start exporting is strongly supported by the regression analyses and by the non-parametric tests. This absence of LBE, even in the long term, might be explained by the fact that new micro-exporters lack the necessary internal resources and capabilities to absorb and benefit from new knowledge and by the fact that they do not survive long as exporters given their low levels of productivity, deterring potential LBE gains. All the evidence obtained does not support the existence of significant LBE effects on new micro-exporters in line with previous findings of the NNTT literature, which has not found conclusive evidence in favor of the LBE effect yet, as well as with the export entry conceptual framework for micro-exporters.

7. Conclusions

7.1. Conclusions and limitations of the study

The NNTT literature proposes the existence of a LBE effect for exporters, a mechanism whereby firms improve their productivity after entering the international market, generated by a learning process about quality, production techniques, management, technology, and product innovation, stimulated by the interaction with international customers, foreign agencies and rivals.

Nevertheless, there is not a consensus on the existence of the LBE effect yet, as it seems to be present only for some countries, for some industries, and for some firms.

Chapter III proposes an export entry conceptual framework where a large group of small firms with low productivity and few resources access the international market by selecting export entry strategies which reduce the export entry cost to a negligible level and severely limit the volume exported, reason why these firms become micro-exporters. Given the export entry strategies followed by new micro-exporters, they do not obtain significant LBE productivity gains as they do not develop the required export commitment to benefit from knowledge and technology transfers from international agents. Accordingly, the hypothesis that new micro-exporters do not experience higher productivity growths compared to non-exporters after starting to export is proposed and corroborated with panel data of Spanish manufacturing firms from 1990 to 2015, contesting the existence of a LBE effect among new micro-exporters.

The absence of significant LBE gains for micro-exporters, as proposed by the export entry conceptual framework, can be explained by the fact that LBE requires commitment, effort and time in order to learn from international customers and competitors, to assimilate this new knowledge and to implement it through the adoption of new techniques, technologies and products which have an overall positive effect on productivity. Nevertheless, new micro-exporters are not enough self-challenged by exports and they lack the necessary internal resources (absorptive capacity) to build up sufficient learning from the export market to crystalize into productivity gains at the firm level.

The proposed export entry conceptual framework and the results for new micro-exporters on the LBE effect do not contradict previous findings of the NNTT literature because it is still hotly debated whether the LBE effect exists and, if so, what are its causes and consequences. Rather, the export entry conceptual framework delineated in Chapter III complements and expands the existing international trade theory by incorporating the export dynamics of a neglected group of exporters, the micro-exporters, which represent a great proportion of all exporting firms in many countries.

Nevertheless, the performed analysis on the LBE effect for new micro-exporters is not free from limitations. First of all, the sample of firms only includes one country, Spain, so the hypothesis should be tested for other countries to corroborate the results. And secondly, the sample only covers manufacturing firms, whereas certain attributes of the international trade of services such as intangibility and inseparability diverge from those attributes of manufactured products, and might influence the export entry strategies of services exporters.

7.2. Business strategy implications, economic policy implications and avenues for further research

Starting to export, even through unsolicited orders from abroad, is the consequence of a conscious decision on behalf of the firm by managers and owners. Nonetheless, starting to export is not the panacea. Managers and owners of firms with few resources and low productivity should be aware of the limited benefits that the export market can dispense and the great efforts (resources, risk, time) which they require to compete with any guarantee of success in the export market. There is evidence for a market driven selection process where exporters which have low productivity fail as successful exporters, while only those which are more productive continue to export (Wagner, 2012). Rephrasing the famous saying *getting there is only half the battle*, it can be said that starting to export is only half the battle.

Exporting is not a lever of riches or productivity itself, but one of the many activities which can support the growth strategy of a firm. Starting to export opens an immense untapped potential new market where to exploit economies of scale and accelerate the learning curve process. It may also give access to new knowledge, technology and ideas, not available locally, which can be implemented by the firm. Therefore, exporting is just a means to an end. The end, for instance, can be to accelerate sales growth, reduce underused capacity, or increase the ROI of technology investments. Nevertheless, exporting should never be an end on itself. This is a traditional mistake by decision makers which must be amended, as they often justify irrational efforts for the sake of exporting. Small firms should carefully examine if diverting to the export activity the much needed scarce resources which are required to compete in the local market fits into their whole strategy because, in the short term, they can end up being expelled from the export market and losing their grip in the local market, concluding the export venture worst off.

Regarding the economic policy implications, the international trade literature often justifies export promotion policies as a lever to increase national welfare (Atkin et al., 2017). Nevertheless, the results obtained are disheartening since they suggest that if export promotion programs (EPP) are targeted to micro-exporters, which represent a great share of the exporting community, they will have irrelevant effects on firm productivity and on the national welfare level. That is because, by reducing the cost of entry into exports, EPPs may facilitate the entry of less productive firms, which are more likely to fail and less likely to learn from the export experience (Fernandes and Isgut, 2015). Thus, EPPs cannot be justified if they are addressed to potential new micro-exporters. Nevertheless, it is not an easy task to distinguish between potential new micro-exporters and potential new large exporters, before exporting takes place. As a rule of thumb, firms with few employees, low labor productivity, no foreign ownership in the firm's equity, low wages, small R&D and marketing intensity rates and low capital intensity should be under suspicion of becoming micro-exporters.

EPPs should be carefully evaluated during the design and implementation phases to target potential future exporters which have enough internal resources and capabilities to compete with guarantees in the international market and which have the commitment to invest resources and time to the export market. At the same time, EPPs should avoid aiming firms with plenty resources and ample internal capabilities since these firms already have all things required to start exporting, to prevent the export incentive from becoming a pointless financial subsidy with a marginal impact. All things considered, EPPs should be reoriented from facilitating the access to the international market, to enhance all potential sources of LBE, such as product innovations catered to international markets, the acquisition of foreign cutting-edge technology and hiring human resources with new market skills or training the existing personnel, whenever the beneficiary firms prove a minimum level of export solvency.

The avenues for further research point to an enrichment of the proposed basic export entry framework for new micro-exporters performing specific case studies. Pack (2006) argues that case studies provide a rich source of evidence on the microeconomic details which contribute to a deeper understanding of firm dynamics. He supports the idea that evidence from case studies reveals limitations in econometric studies due to the absence of information in firm-level censuses and helps to frame new relevant questions. Besides, it is very important not to forget that obtaining the opinion of the subjects under investigation is the only advantage which economy has over physics, and that much can be learn from case studies (Freeman, 1989; Wagner, 2016). Interviews with managers and owners of small firms with low productivity and few resources might help to better understand the managerial motivations behind the international venture, the limitations which firms face to obtain and implement new knowledge and technology from the foreign market and how best to cope with them, the most cost-efficient sources of LBE and the optimal strategies for small firms which begin as micro-exporters to continuously grow their sales abroad in order to become large exporters.

Furthermore, considering the limitations of this study and the ubiquity of micro-exporters around the world, the test of LBE on new micro-exporters should be performed in new countries other than Spain, including firms from the services sector in order to try to replicate the results obtained and validate the hypothesis and the conceptual framework. Replication is the foundation of science and any research which cannot be replicated cannot be termed scientific (McCullough and Vinod, 2003). The process of replication can take on two different forms, one called pure replication, which is the reproducibility of a research to obtain the same results. And another called scientific replication, which involves reexamining an idea with different data in order to obtain similar results over space and time with the expectation of obtaining stylized facts if sufficient replications point towards the same conclusions (Hamermesh, 2007).

Annexes

Table a21. Summary of the relevant NNTT literature to the learning by exporting effect

Year	Author/s	Data	Methodology	Results for the learning by exporting effect
1995	Bernard and Jensen	56,000 US manufacturing firms for the period 1976-1987. Plants with more than 250 employees are sampled with certainty, others with probability <1	OLS regression	There is a negative correlation between starting to export and wage growth during the entry year and for longer periods. Employment growth is positively correlated for the entry year but uncorrelated for longer periods. The indirect evidence does not support the LBE hypothesis as starting to export does not increase wages or employment at the firm level
1997	Bernard and Wagner	Near 4,330 Lower Saxony (Germany) manufacturing plants with at least 20 employees for the period 1978-1992	OLS regression	There is little or no evidence that exporting by itself enhances performance. Shipments, wages and labor productivity, measured as sales per worker and valued added per worker, do not grow faster for exporters after entry into the export market, compared to non-exporters. The data contradicts the LBE effect by which new exporters get a productivity boost after starting to export
1998	Clerides, Lach and Tybout	Colombian plants with at least 10 workers for the period 1981-1991, for Mexico 2,800 large firms for the period 1986-1990, and for Morocco firms with at least 10 workers	Probit model	The average variable cost and the labor productivity, measured as sales per worker, of a firm generally do not improve after entering foreign markets. The export history of a firm does not significantly

		for the period 1984-1991. All export-oriented industrial plants		shift the production cost function and when it shifts it, is in a negative way. The data resembles an scenario with no LBE effects
1999	Bernard and Jensen	50,000-60,000 US manufacturing firms for the period 1984-1992. Plants with more than 250 employees are sampled with certainty, others with probability <1	OLS regression	During the first year after entry into the export market shipments and employment grow faster for exporters than for non-exporters, but the productivity growth, measured as TFP and labor productivity by value added per worker, is no higher compared to non-exporting firms. Over longer intervals of time, the benefits of exporting are limited to a faster employment growth, while shipments show no growth difference, and the productivity and wages growth is lower for exporters compared to non-exporters. These results do not suggest that exporting leads to a faster productivity growth and contradicts the LBE hypothesis
1999	Kraay	2,105 Chinese large and medium-sized manufacturing firms for the period 1988-1992	OLS regression	There is statistically significant evidences to support the LBE hypothesis. Past exports are positively associated with current labor productivity, measured as TFP and labor productivity by sales per worker, and negatively associated with unit costs. LBE effects are most pronounced among established exporters than for switchers and entrants. For new entrants LBE effects are insignificant and occasionally negative
1999	Sjöholm	2,892 Indonesian domestically owned manufacturing establishments with more than 20 employees for the years 1980 and 1991	OLS regression OLS robust regression	Indonesian manufacturing exporters show higher growths of value added, employment, and investment intensity, than non-exporters, after starting to export, regardless of the competitiveness of the local market. The larger the export intensity, the higher the growth rate.

				However, imports, in most cases, do not affect growth rates. The results obtained support the existence of a LBE effect among exporters
2000	Aw, Chung and Roberts	About 12,000 manufacturing plants in Taiwan for the years 1981, 1986 and 1991, and 22,000 plants with more than 5 workers for South Korean manufacturing plants for the years 1983, 1988 and 1993. Only manufacturing plants from 5 major export industries	OLS regression	In Taiwan, the initial productivity differential, measured as TFP, between new exporters and non-exporters, widens after entry into the export market, in three of the five selected industries, and it is not statistically significant for the other two industries. For South Korea, the productivity differential between entrants and non-exporters widens following entry, but the change is not statistically significant in all five industries. Some results are consistent with the LBE hypothesis, while other do not. There is mixed and unclear evidence in favor of the LBE
2001	Isgut	10,747 Colombian manufacturing plants with 10 or more employees for the period 1981-1991	OLS regression	After entry into exports, sales, employment, and the proportion of skilled workers in the labor force, grow faster for exporters compared to non-exporters, over horizons of 3 to 5 years after entry. However, the growth of labor productivity, measured as sales per worker and value added per worker, and capital intensity, does not differ significantly for exporters and non-exporters. There is no clear evidence in favor of the LBE effect
2002	Castellani	2,117 Italian manufacturing firms with more than 10 employees that answer two waves of surveys in the years 1989 and 1992	OLS regression	The author finds that entering the export market does not produce per se any LBE effect. However, there are productivity LBE effects, measured as TFP, for export starters which have high export intensity levels. A significant involvement of the firm in

				international activities is needed to capture the benefits from exporting and translate them into productivity gains
2002	Delgado, Fariñas and Ruano	About 1,800 Spanish manufacturing firms per year with at least 10 employees for the period 1991-1996. Includes with certainty 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	One and two-sided Kolmogorov-Smirnov tests	In the entry year the productivity growth distribution of exporters, measured as TFP, is similar to that of non-exporters. Furthermore, in the period after entry into the export market, there are no significant differences between the productivity growth distribution of entering exporters and that of non-exporters. There is no evidence in favor of the LBE effect for the whole sample of firms. Only for young firms, less than 5-year old, the post-entry productivity growth is greater for young exporters than for young non-exporters. The authors find mixed and limited evidence to support the LBE hypothesis
2002	Wagner	Lower Saxony (Germany) manufacturing plants with at least 20 employees for the period 1978-1989	Matching method	A comparison of the performance of export starters and non-exporters reveals a causal effect of starting to export on firm size growth, while this growth difference becomes smaller for wages and non-significant for labor productivity, measured as sales per worker. Exporting seems to positively affect firm performance, however not the labor productivity of a firm, so there is weak evidence to support the LBE effect
2003	Baldwin and Gu	Canadian manufacturing plants using survey data for large plants and tax records data for the rest of the plants, for the years 1974,	OLS regression	Entrants to export market have faster productivity growth, measured as TFP and labor productivity by value added per worker, than non-entrants. Export participation leads to better productivity performance even after controlling for the selection bias of more

		1979, 1984, 1990, 1993 and 1996. All small plants are assumed to be non-exporters		productive firms into exports. Morevore, young plants and domestic-owned plants enjoy higher LBE effects. The data analyzed is aligned with the LBE hypothesis
2004	Bernard and Jensen	50,000 to 60,000 US manufacturing plants for the period 1983-1992. Plants with more than 250 employees are sampled with certainty, and others with probability <1	OLS regression	There is little evidence that exporting increases productivity growth, measured as TFP. The faster productivity growth for new exporters compared to non-exporters only holds for the entry year, but becomes non-existent thereafter. However, for new exporters the employment level grows faster during the entry period and years after, relative to non-exporters. Therefore, trade might improve welfare, but not by boosting the productivity of firms, but by a reallocation of resources, such as the workforce, from the least productive to the most productive firms. There is no evidence to support the LBE effect
2004	Girma, Greenaway and Kneller	8,992 UK manufacturing companies over the period 1988-1999. They omit foreign firms, parent firms, and 1 percent top and bottom outliers	Propensity score matching (PSM) method Difference-in-differences	During the entry year and the next one, exporting firms experience higher productivity growth rates, measured as TFP and labor productivity, than non-exporters. The authors find evidence in favor of the LBE hypothesis for the first two years exporting, with greater learning effects for more export intensive firms
2004	Mengistae and Pattillo	About 230 manufacturing firms per year for Ethiopia, Ghana and Kenya, for the period 1992-1995 (depending on the country) and	Generalized least squares (GLS) estimator	The authors obtain indirect evidence in favor of the LBE effect. Direct exporters have higher productivity levels, measured as TFP, than indirect exporters, consistent with learning effects. Besides, exporters to destinations outside Africa experience higher

		focused on some industries such as woodwork and metalwork	OLS linear regression	productivity growths than those exporting within the region. These results are consistent with the LBE hypothesis
2005	Alvarez and López	7,132 Chilean manufacturing plants with at least 10 employees for the period 1990-1996	OLS regression	There is evidence favorable to the LBE hypothesis only for entering exporters and not for continuous exporters. Productivity gains, measured as TFP, for entering plants are short lived. Furthermore, there is no LBE effect for continuous exporters. There is mixed and unclear evidence regarding the LBE hypothesis
2005	Arnold and Hussinger	389 German small, medium and large sized manufacturing firms for the period 1992-2000	Matching method Granger-causation test	There are no significant differences in the productivity growth rates, measured as TFP, between exporters and non-exporters. The authors cannot find significant productivity gains from exporting. Therefore, exporting itself does not help firms to improve their productivity levels. The authors find evidence contrary to the LBE effect
2005	Greenaway, Gullstrand and Kneller	3,570 Swedish manufacturing and services firms for the period 1980-1997	Differences-in-differences	New exporters do not experience faster productivity gains, measured as TFP and labor productivity, compared to non-exporters. However, entry into the export market is associated with faster growths in sales, employment and wages, but only during the entry year. There is no clear evidence to support the existence of a LBE effect among exporters
2005	Hahn	Near 80,000 South Korean manufacturing plants per year with 5 or more employees for the period 1990-1998	Descriptive statistics OLS regression	Without any control variable, the productivity growth, measured as TFP, of exporters is significantly higher than for non-exporters. With control variables, the LBE effect becomes negative and insignificant. Furthermore, exporters experience a faster growth in

				employment but not in output compared to non-exporters. Examining the history of plants during a five-year period, those that start exporting widen the productivity, the output and the workforce gap, with those that never export, and close the gap with those that always export. However, the LBE effect is short-lived and pronounced immediately after entry into exports
2006	López	3,427 Colombian manufacturing firms for the period 1992-2002	OLS robust regression with fixed effects	The analyzed data shows that the export experience reduces the average variable cost of a firm, but not immediately after stating to export, only in the medium term. This might indicate that it takes time for a firm to learn from the export market and implement the necessary improvements. The results support the LBE hypothesis
2007	Aw, Roberts and Winston	Large and technologically advanced Taiwanese manufacturing firms in the electronics industry for the years 1986, 1991 and 1996	Probit model	There are complementarities between exporting and investing in R&D or training the employees, with a positive effect on the future productivity of a firm, measured as TFP. Exporters that invest in R&D and train their workers have a higher future productivity than firms that only export. R&D investment and training facilitate firms to benefit from their exposure to the export market. These findings support the existence of a LBE effect among exporters
2007	De Loecker	6,391 Slovenian manufacturing firms for the period 1994-2000	Matching method	There is an immediate increase in labor productivity, measured as value added per worker, after starting to export and long-term productivity growths too. However, the LBE effect varies within industries, where some industries experience no LBE effect, others a short-term LBE effect, and the majority a long-term LBE effect.

				Additionally, exporters that serve more developed economies experience higher LBE effects. The evidence obtained points towards the existence of a LBE effect
2007	Fariñas and Martín	About 1,800 Spanish manufacturing firms per year with at least 10 employees for the period 1990-1999. Includes with certainty 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	OLS regression PSM method	Entering exporters do not experience significant higher productivity growths, measured as TFP, compared to non-exporters. The only exception is the food industry, where the unmatched sample gives a significant productivity growth difference, which becomes non-significant with a matched sample. These findings do not support the LBE hypothesis
2007	Wagner	54 NNTT empirical papers for 34 countries that use micro-data at the firm level published between 1995 and 2006	Meta-analysis	The evidence collected by dozens of papers regarding the LBE hypothesis is somewhat mixed. Results for post-entry differences in performance between export starters and non-exporters is found only in a few studies. Therefore, the NNTT literature cannot support that exporting necessarily improves the firm's performance
2008	ISGEP	Firm level data for companies with at least 20 employees for 14 different countries of the EU, Latin America and China	OLS regression	The authors do not find evidence in favor of the LBE hypothesis. Faster labor productivity gains, measured as sales per worker, for exporters compared to non-exporters are only found in one country (Italy), being not statistically significant for other 12 countries, and negative for China

2008	Serti and Tomasi	38,771 Italian manufacturing firms with 20 or more employees for the period 1989-1997, with near 20,000 firms per year	PSM method Difference-in-difference	The authors obtain robust evidence of positive LBE effects of the export activity on productivity, measured as TFP and labor productivity by value added per worker, sales, capital and the workforce. The positive effects of exporting on firms' performance increases as firms accumulate experience in the export market. Productivity post-entry effects are not merely associated with the enlargement of the scale of operations, but with more structural changes at the firm level
2008	Trofimenko	5,938 Colombian manufacturing plants with 10 or more employees for the period 1981-1991	OLS regression Quantile regression	There is evidence to support the LBE hypothesis. Firms that export to richer countries enjoy greater productivity boosts, measured as TFP, than non-exporters and firms that export to low-income countries. Moreover, relatively more productive plants benefit more from exporting, but in low-technology industries the impact of exporting to more advanced markets is significant only for the most productive plants
2009	Granér and Isaksson	161 Kenyan manufacturing firms in four main cities with more than 5 employees, for the period 1992-1994	OLS regression OLS regression with fixed effects	The authors find weak support for the LBE effect, due to the fact that the learning effect is obtained only when exporters trade with other African countries, while exports outside Africa do not trigger significant LBE effects. There is mixed and unclear evidence regarding the LBE hypothesis
2010	Avella and García	Near 2,469 Spanish SMEs from the manufacturing sector with less than 250	OLS regression	Spanish SMEs do not learn from the export activity since the labor productivity of exporters, measured as value added per worker, does

		employees, independently owned and with sales no higher than Eur 50 million, for the period 1990-2002		not improve significantly even three years after starting to export. Furthermore, export intensity negatively affects the labor productivity growth of exporting firms, in the short and in the long term. The authors do not find positive evidence in favor of the LBE hypothesis
2010	Ito and Lechevalier	Approximately 12,000 Japanese manufacturing firms with 50 or more employees for the period 1994-2003	PSM method Difference-in-difference	The results obtained indicate that a firm decision regarding exporting and investing in R&D strongly affects future productivity, measured as TFP and labor productivity by value added per worker. R&D activities and export involvement have complementary effects on future productivity. Besides, the productivity growth is higher for new exporters than for continuous exporters. Evidence in favor of the LBE effect
2010	Kox and Rojas	Dutch manufacturing and services plants with 50 or more employees sampled with certainty and with less than 50 employees sampled on a rotatory basis for the period 1999-2005 Dutch manufacturing and services firms with equity higher than Eur 23 million for the period 1997-2005	OLS regression	The authors do not find empirical support for the LBE hypothesis among the manufacturing and services firms analyzed. There are no significant differences in the labor productivity growth, measured as sales per worker and value added per worker, between exporters and non-exporters. The authors do not find LBE effects even among technologically backward firms with a greater learning potential
2010	Lileeva and Trefler	5,247 Canadian plants that were non-exporters before the FTA with US was	OLS regression	After the FTA with US was implemented, the data shows that there are faster labor productivity growths, measured as value added per

		implemented in 1989, with data for the period 1984-1996	Probit model	worker, for new exporters with low pre-export productivity levels, and for those new exporters which invest as a complimentary activity to exports, compared to non-exporters. Evidence in favor of the LBE hypothesis, but only for those new exporters which invest in productivity enhancing activities while exporting
2010	Yang and Mallick	2,340 Chinese firms with 15 or more employees for the period 2000-2002, from 18 major Chinese cities	Difference-in-difference	The authors find that exporters tend to have higher sales growth and employment growth than non-exporters in the first year after entry into the export market. However, they do not have higher productivity growths, measured as TFP and labor productivity by sales per worker, than non-exporters during the entry year, but they have a higher productivity growth during the second year. Therefore, there is positive but scarce evidence in favor of the LBE hypothesis
2011	Ranjan and Raychaudhuri	Large Indian manufacturing firms for the period 1990-2006. The mean size of the firms sampled exceeds 3,000 employees (large firms sampled)	PSM method	There is evidence which suggests that there are productivity gains from the LBE effect, measured as TFP and labor productivity by sales per worker and value added per worker. Exporters increase faster their productivity levels than firms which do not start to export. The authors find compelling evidence to support the existence of a LBE effect among exporters
2011	Sharma and Kumar	Indian manufacturing firms for the period 1994-2006, for four industries: cotton textile, electrical, pharmaceutical and transport equipment	Generalized method of moments (GMM) estimator	The export intensity of a firm only affects positively its productivity level, measured as TFP, for companies in the cotton textile industry, but not for companies in the other three industries. Additionally, starting to export does not increase productivity during the entry year, and firms that continue to export experience a decline in their

				productivity levels. The results contradict the existence of a LBE effect among exporters
2011	Vogel	German services sector firms with at least one insured employee and firm turnover higher than Eur 17,081, for the period 2001-2005	OLS regression	In both parts of Germany (East and West) for services sector firms, starting to export does not have a significant impact on labor productivity growth rates, measured as sales per worker, compared to non-exporting firms, during the entry year into exports. There is no evidence to sustain the LBE hypothesis
2012	Barboni, Ferrari, Melgarejo and Peluffo	1,330 Uruguayan manufacturing plants with more than 5 workers for the period 1997-2005	OLS regression	The results obtained indicate the existence of a learning process at the beginning of exporting, but not a learning process long after breaking into foreign markets. Besides, there is no evidence of significant increases in productivity, measured as TFP, after starting to export to developed countries for exporters, while there are higher gains in productivity associated with exports to developing countries. All in all, there are mixed results regarding the existence of a LBE effect
2012	García, Avella and Fernández	About 1,534 Spanish manufacturing with at least 10 employees for the period 1990-2002. The sample includes 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	OLS regression with fixed effects	The authors find positive evidence in favor of the LBE effect when productivity is measured as TFP and labor productivity by value added per worker. However, not all firms benefit equally from the LBE effect. Exporters that are more R&D intensive experience higher increases in productivity due to the learning effects after starting to export, than exporters with low levels of innovation

2012	Haidar	33,510 domestically owned Indian manufacturing firms for the period 1991-2004	OLS regression PSM method	Export starters experience higher capital and sales growths than non-exporters, but only during the entry year to the export activity with very weak effects. Regarding productivity LBE effects, measured as TFP, after starting to export, new exporters do not experience faster productivity growths than non-exporters. There is no evidence in favor of the LBE effect for the set of firms analyzed
2012	Wagner	25 NNTT empirical papers for 11 countries which use micro-data at the firm level published between 2006 and 2011	Meta-analysis	From the data contained in the NNTT papers analyzed, there is no clear evidence in favor the LBE effect for manufacturing and services exporters. Nevertheless, the results between studies are very difficult to compare given the lack of homogeneity in the testing procedures across studies, and the diversity of results obtained. The jury is still out for the LBE hypothesis
2013	Boermans	More than 1,000 SMEs manufacturing firms from Ghana, Kenya, Nigeria, South Africa and Tanzania for the period 1991-2003	Matching method Difference-in-difference	Exporters show faster productivity growth, measured as TFP, than non-exporters, but this difference is negligible when compared to matched non-exporters. However, export participation leads to faster growth in employment, earnings and workers' education. Moreover, firms that export outside Africa benefit more from the LBE effect, including faster productivity growths. There is some support in favor of the LBE hypothesis
2013	De Loecker	6,391 Slovenian manufacturing firms for the period 1994-2000	Difference-in-difference	There are evidences of substantial productivity gains, measured as TFP, associated with export entry. Therefore, export participation is an important indicator of future productivity gains as predicted by

			Nonparametric test	the LBE effect. However, these productivity gains are heterogeneous among firms, depending on the initial level of productivity, where very productive firms get lower productivity gains from the LBE effect. The author finds concluding evidence in favor of the LBE effect
2013	Love and Ganotakis	412 high-technology SMEs based in UK less than 25 years old and where an individual owner owns at least 50 percent of the company	Probit model Truncated regression	The authors find evidence in favor of technological LBE effects, but conditional on the export entry behavior of the firm. The export activity helps high-technology SMEs to innovate more, measured as innovative products per total sales, but it does not make firms more innovation intensive. Furthermore, export persistence helps firms to overcome innovation barriers. There is evidence of positive LBE effects, but not measured for productivity
2013	Manjón, Máñez, Rochina and Sanchis	2,142 Spanish manufacturing with at least 10 employees for the period 1990-2008. The sample includes 70 percent of firms with more than 200 workers and 5 percent of firms with 10 to 200 workers	PSM method	The results obtained support that exporting has a positive impact on productivity growth, measured as TFP. This effect is higher for persistent exporters, those firms which export consecutively for 5 years, and for exporters that increase the export intensity over time. The authors find evidence aligned with the LBE hypothesis
2014	Bravo, Benavente and González	Chilean manufacturing firms with 10 or more workers for the period 1997-2004	Asymptotic least squares (ALS) regression	The authors find that R&D activities result in productivity growths, measured as TFP and labor productivity by value added per worker, but also that exporting increases productivity through a LBE effect. The results imply that R&D affects productivity directly and indirectly through promoting exports. There is evidence in favor of

				the LBE effect, where both exports and R&D have a combined positive effect on productivity
2014	Foster, Isaksson and Kaulich	3,090 manufacturing firms and 2,391 services firms for 19 countries in sub-Saharan Africa for the year 2010, with stratified sampling according to their size	OLS robust regression Least absolute deviations (LAD) MM robust regression	The authors find limited evidence for the presence of LBE effects for manufacturing firms. LBE effects are only visible when using the MM robust regression. The estimated magnitude of labor productivity gains, measured by sales per worker, due to export entry is low. For firms in the services sector no LBE effects are detected. There is few evidence to support the LBE hypothesis
2014	Minondo	Approximately 17,000 Spanish services sector firms per year with 10 or more employees for the period 2001-2007	Matching method	The data shows that the differences in productivity growth, measured as labor productivity, between export starters and non-exporters is only significant during the entry year into the export market, and becomes non-significant in the following years. The results obtained offer weak evidence in favor of the LBE hypothesis
2014	Yang and Mallick	34 NNTT empirical studies on the LBE effect for 31 countries that use micro data at a firm-level, published between 1999 and 2010	Meta-analysis	The results of the NNTT papers analyzed support the existence of the LBE effect among exporters, with greater benefits on productivity from exporting when the firm belongs to a country with high export competitivity and high external demand. Other factors such as the country's gross domestic product (GDP) growth, the inflation rate, and the trade openness, appear to be less important in defining the impact of LBE effects at a country level

2015	Casas, Díez and González	Over 4,000 Colombian non-commodities manufacturing firms for the period 2005-2013. The average firm employs 160 workers (large firms sampled)	OLS regression Probit model	Entering the export market does not seem to increase per se the productivity level of a firm, measured as TFP. This finding contradicts the existence of a LBE effect among exporters
2015	Fernandes and Isgut	Colombian manufacturing firms for the period 1981-1991	OLS regression	In the set of firms analyzed, there are productivity boosts, measured as TFP, from LBE effects for continuous exporters. Moreover, there are internal spillovers, at a firm level, from export-related activities to domestic market activities. Additionally, LBE effects are smaller for more experienced exporters than for new exporters. However, there are no LBE effects for firms that stop exporting or for those that export irregularly
2016	Vu, Holmes, Tran and Lim	1,664 Vietnamese non-state owned domestic manufacturing SMEs with data for the years 2005, 2007 and 2009, including firms from the informal sector	GMM robust model with fixed effects	Export participation has a statistically insignificant effect on productivity, measured as TFP and labor productivity by value added per worker. The export status of a firm shows an insignificant association with productivity growth, with increases in economies of scale, with improvements in technical efficiency, and with advancements in technical progress. The results do not appear to support the hypothesis of the LBE effect for exporters
2017	Atkin, Khandelwal and Osman	219 Egyptian duble rug manufacturing establishments from the city of Fowa with less than 5 employees, for the period 2011-2014	Randomized controlled trial	Exporting firms of high-quality products to high-income countries obtain higher profits and exhibit larger improvements in productivity, measured as TFP, and quality, relative to non-exporting firms, after starting to export. The authors obtain positive

				evidence in favor of the LBE effect and the existence of learning curves over time, obtained from knowledge transfers from the export market for which exporters do not pay
2017	Cruz, Newman, Rand and Tarp	5 surveys for 275 Mozambican manufacturing firms for the period 1999-2006. The average size of firms in the sample is larger than the average size of firms in the population (large firms sampled)	OLS robust regression Matching method	The authors find that exporting firms experience higher labor productivity growths, measured as sales per worker, than non-exporting firms. However, most part of this higher productivity growth is driven by non-observed factors. The evidence obtained is aligned with the existence of an LBE effect among exporting firms
2017	Newman, Rand, Tarp and Anh	Vietnamese firms for the period 2005-2012. Firms with more than 30 employees are included with certainty, smaller firms not	OLS regression with fixed effects GMM method with fixed effects	Firms with more years of experience in the export market have higher labor productivity levels, measured as value added per worker. This suggests that the learning effect accumulates over time with the export activity. Exporting has a positive and non-diminishing impact on productivity. Besides, foreign-owned firms experience greater productivity gains associated with LBE effects than private-owned and state-owned firms. There is evidence in favor of the LBE effect
2017	Rehman	More than 15,000 manufacturing and services sector formal firms from 29 Eurasia and Central and Eastern Europe countries, with 5 or more employees, for the year 2011	Crépon, Duguet and Mairesse (CDM) model	The export activity positively influences firm's innovation and productivity levels, measured as TFP. Furthermore, a small increase in firm's export intensity rises innovation in a similar percentage, but increases much more the productivity level of a firm. There is evidence in favor of the LBE hypothesis among the exporters analyzed

2017	Siba and Gebreeyesus	Approximately 1,000 Ethiopian manufacturing firms with at least 10 employees for the period 1996-2009	OLS robust regression GMM robust method	The authors find robust evidence to support the existence of the LBE effect. They find that exporting improves firm labor productivity levels, measured as sales per worker. This result is consistent when export-oriented industries are analyzed, but also for all manufacturing industries in Ethiopia
2018	Yun	Vietnamese manufacturing micro, small and medium enterprises (MSME) with no more than 200 workers for the years 2011, 2013 and 2015	OLS regression	In a two-year and a four-year period, the export activity has a significant negative effect on labor productivity growth, measured as value added per worker, and capital intensity growth. While it has a significant positive effect on employment growth. In general, for different types of exporters, the positive effects of exports on firm performance shows up only in the medium term, supporting the LBE hypothesis, but not for productivity
2019	Garcia and Voigtländer	About 5,000 Chilean manufacturing plants per year with 10 or more workers for the period 1996-2007, Colombian plants for the period 2001-2013, and Mexican plants for 1994-2003	OLS regression with fixed effects PSM method	Firms, after starting to export, increase more their production, reduce more their prices, and lower more their marginal production costs, than firms that do not export, even 3 years after the export activity commences. Additionally, they increase their productivity, measured as TFP by quantities, and reduce their average variable costs more than non-exporters. However, given the reduction in prices after starting to export, the productivity level, when measured as TFP by revenue, does not vary significantly. There is evidence to support the LBE effect when the productivity growth is measured by output and not by revenue

Table a22. Descriptive statistics for all the variables included in the research model for the LBE effect by export status group, panel data for the period 1990-2015 (constant values in euros)

Export status					
New micro-exporters <= €25,000					
Variable	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_t$	17,477.15	669,241.30	84,007.70	70,393.80	67,291.54
VA/worker $_t$	178.07	390,840.70	32,776.88	27,260.59	32,124.33
Sales/worker $_{t-1}$	9,533.24	677,806.30	84,460.81	71,542.84	65,854.23
VA/worker $_{t-1}$	1,574.78	120,738.60	31,736.18	28,567.02	17,174.59
Employees $_t$	4.00	617.00	29.83	17.00	60.56
Wage/worker $_t$	7,579.58	66,385.68	24,248.83	22,595.22	8,954.91
Age $_t$	3.00	121.00	20.62	19.00	14.36
Capital/worker $_t$	451.96	697,778.70	42,651.05	27,412.48	63,298.80
Foreign $_t$	0.00	49.00	0.27	0.00	3.62
R&D/sales $_t$	0.00	16.49	0.21	0.00	1.37
Wage/hour $_t$	4.85	37.75	13.83	12.91	5.26
Marketing/sales $_t$	0.00	6.80	0.80	0.30	1.29
New micro-exporters <= €50,000					
Variable	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_t$	17,477.15	2,819,971.00	101,560.70	76,274.19	178,116.00
VA/worker $_t$	178.07	390,840.70	34,130.28	28,597.53	33,478.18
Sales/worker $_{t-1}$	9,533.24	2,648,969.00	100,354.50	74,116.62	168,875.10
VA/worker $_{t-1}$	1,574.78	274,085.40	33,696.91	29,540.69	22,868.22
Employees $_t$	4.00	617.00	30.68	19.00	52.53
Wage/worker $_t$	7,579.58	66,385.68	24,021.50	22,024.45	93,64.89
Age $_t$	3.00	121.00	21.33	19.00	14.32
Capital/worker $_t$	451.96	800,107.30	43,618.05	25,955.17	76,698.29
Foreign $_t$	0.00	100.00	0.79	0.00	7.35
R&D/sales $_t$	0.00	16.49	0.23	0.00	1.35
Wage/hour $_t$	4.84	37.75	13.63	12.62	5.44
Marketing/sales $_t$	0.00	7.80	0.72	0.20	1.28
Non-exporters					
Variable	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_t$	690.36	3,252,992.00	98,966.63	69,905.60	112,647.30
VA/worker $_t$	20.45	403,526.60	34,359.22	28,626.17	25,631.17
Sales/worker $_{t-1}$	690.36	3,252,992.00	99,004.73	70,259.00	112,743.40
VA/worker $_{t-1}$	14.30	460,807.60	34,682.02	28,839.37	26,107.45
Employees $_t$	1.00	5,408.00	46.75	19.00	143.37
Wage/worker $_t$	2,022.30	166,941.30	24,706.68	22,801.10	10,890.24
Age $_t$	2.00	155.00	23.04	18.00	19.22

Capital/worker $_t$	37.89	6,527,156.00	54,062.00	23,576.70	143,176.90
Foreign $_t$	0.00	100.00	1.63	0.00	11.58
R&D/sales $_t$	0.00	32.86	0.16	0.00	1.09
Wage/hour $_t$	1.19	94.79	14.01	12.85	6.34
Marketing/sales $_t$	0.00	43.60	0.58	0.10	1.60
Non-exporters (five consecutive years no exporting)					
Variable	**Minimum**	**Maximum**	**Mean**	**Median**	**Standard deviation**
Sales/worker $_t$	528.81	3,252,992.00	101,184.10	71,009.61	118,457.10
VA/worker $_t$	20.45	646,356.50	34,929.66	28,895.00	26,978.26
Sales/worker $_{t-1}$	690.36	3,252,992.00	101,009.10	71,282.99	116,666.50
VA/worker $_{t-1}$	14.30	460,807.60	35,118.23	29,183.30	26,398.61
Employees $_t$	1.00	5,408.00	49.26	19.00	149.03
Wage/worker $_t$	2,022.30	166,941.30	24,916.58	22,962.04	11,008.79
Age $_t$	2.00	155.00	23.15	18.00	19.26
Capital/worker $_t$	37.89	6,527,156.00	54,970.94	24,053.84	141,561.40
Foreign $_t$	0.00	100.00	1.87	0.00	12.39
R&D/sales $_t$	0.00	62.33	0.19	0.00	1.29
Wage/hour $_t$	1.19	94.79	14.13	12.95	6.42
Marketing/sales $_t$	0.00	43.60	0.61	0.10	1.73

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1900-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Addendum a3

Alternative testing procedures

The OLS technique is a common testing procedure within the NNTT empirical literature for its suitability to test the LBE hypothesis. However, in order to study the LBE effect alternative testing procedures to the OLS have been proposed. Three alternative methods are explained, analyzed and compared to the OLS technique to find the best fit to test the LBE hypothesis on new micro-exporters.

The first technique, introduced by Wagner (2002), is known as the matching technique. If better firms self-select into exports, new exporters are more productive than non-exporters and they might have been so during the last years. It can be expected that new exporters, on average, might perform better than non-exporters even if they have not started to export yet. However, they already started to export, so there is no data for the counterfactual situation.

By constructing a control group with characteristics as similar as possible to the group of new exporters for all those characteristics that are relevant to start the export activity (initial productivity, age, etc.), every treated unit (new exporter) is matched to an untreated unit (non-exporter) which is as identical as possible at the time before the treatment commences (starting to export). Differences in performance between the two groups (the treated and the matched non-treated) after the treatment (starting to export) can be attributed to the treatment (exporting) (Wagner, 2002).

Nevertheless, new micro-exporters are no more productive than non-exporters before starting to export and they do not enjoy the SS effect. Due to this, the matching technic is not pertinent since there is no reason to believe that without a SS process new micro-exporters will perform better than non-exporters even without starting to export. At any rate, since OLS gives higher estimates of the LBE effect than matching techniques (as it does not control for the SS of new exporters), if there is LBE among new micro-exporters it must be found employing OLS no matter what[19].

[19] The matching technique is not free from critics since it generates an upward bias on LBE. By choosing only successful new exporters as the treated group and non-exporters as the control group, instead of not-yet new exporters, the matching technique overstates the importance of LBE. Additionally, matching can eliminate the selection-bias of observed characteristics, but it is unable to capture unobservable factors (Park et al., 2010).

The second technique is known as quantile regression, pioneered by Yasar et al., (2006). Quantile regression allows to test for differences in the effect of exporting on firm productivity as new exporters range from the lower to the upper tail of the productivity distribution, since it might be plausible that relatively less productive firms have difficulty converting their export experience into higher productivity growths (Yasar et al., 2006). Low-productivity firms may be unprepared to adopt advanced technologies available in the international market. As a consequence, the LBE effect might generate productivity gains only at the upper end of the productivity distribution. However, new micro-exporters are firms within the lowest productivity quantiles. Due to this, therefore quantile regression is not a good technique to test the LBE hypothesis on micro-exporters because their productivity heterogeneity does not allow to test for different marginal effects of exporting on productivity at various levels of the productivity distribution.

The third technique proposed is the generalized propensity score (GPS) method, developed by Imbens (2000) and first applied in the NNTT literature by Fryges (2009). Most studies which investigate the relationship of exports on productivity distinguish between exporters and non-exporters using export status as a binary variable (with value 1 if the firm exports and 0 if the firm does not export). Nevertheless, the exporting effect on productivity can be affected by the export intensity, since firms with low exports/sales ratios may enjoy an insignificant flow of new knowledge and technology from the foreign market.

The GPS method allows for a continuous treatment of the export status through the export intensity level and assumes that a more intense dose (export intensity) of the treatment (export) has more effect (LBE) on the treated (exporter). Nevertheless, new micro-exporters have very low export intensity levels and the group of new micro-exporters does not have enough export intensity heterogeneity to obtain significant results by applying a GPS analysis. Owing to this, the third test is not pertinent to analyze the LBE hypothesis on new micro-exporters.

After comparing the OLS technique with three alternative testing methods: matching technique, quantile regression and GPS, the OLS technique still holds as the best testing procedure to examine the LBE hypothesis on new micro-exporters and it is selected to perform the econometric analysis.

Table a23. Correlation matrix for all the variables included in the regression model for the LBE effect when the dependent variable is sales per worker growth

Status: new micro-exporters vs non-exporters									
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1. LBE $_t$ (log)	1.000								
2. Status	0.002	1.000							
3. Productivity $_{t-1}$ (log)	-0.156	0.011	1.000						
4. Age $_t$ (log)	-0.020	-0.007	0.218	1.000					
5. Size $_t$ (log)	-0.021	-0.011	0.299	0.197	1.000				
6. Wage $_t$ (log)	0.058	-0.005	0.601	0.336	0.333	1.000			
7. Capital $_t$ (log)	0.011	-0.009	0.502	0.358	0.189	0.472	1.000		
8. Foreign $_t$	0.015	-0.011	0.184	0.087	0.310	0.216	0.141	1.000	
9. Innovation $_t$	0.010	-0.014	0.107	0.075	0.266	0.112	0.099	0.141	1.000

Source: Own elaboration with data obtained from the ESEE for the period 1990-2015. Status includes the group of new micro-exporters than do not export more than Eur 50,000/year vs non-exporters, as it subsumes the group of new micro-exporters that do not export more than Eur 25,000/year. Dependent variable is log labor productivity growth measured as sales per worker from year *t-1* to year *t*. When the dependent variable is tested for the rest of the periods only in *t+3* another correlation becomes higher than 0.500, wage and capital (0.5). When correlations are calculated with new micro-exporters that do not export more than Eur 25,000/year, there are no additional correlations higher than 0.500 and the results remain highly consistent.

Table a24. Correlation matrix for all the variables included in the regression model for the LBE effect when the dependent variable is value added per worker growth

Status: new micro-exporters vs non-exporters									
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1. LBE t (log)	1.000								
2. Status	-0.017	1.000							
3. Productivity $_{t-1}$ (log)	-0.374	0.007	1.000						
4. Age $_t$ (log)	-0.021	-0.009	0.227	1.000					
5. Size $_t$ (log)	-0.009	-0.010	0.331	0.201	1.000				
6. Wage $_t$ (log)	0.035	-0.002	0.661	0.342	0.331	1.000			
7. Capital $_t$ (log)	-0.004	-0.008	0.425	0.359	0.193	0.476	1.000		
8. Foreign $_t$	0.007	-0.010	0.176	0.087	0.312	0.218	0.145	1.000	
9. Innovation $_t$	-0.005	-0.014	0.112	0.077	0.269	0.116	0.102	0.140	1.000

Source: Own elaboration with data obtained from the ESEE for the period 1990-2015. Status includes the group of new micro-exporters than do not export more than Eur 50,000/year vs non-exporters, as it subsumes the group of new micro-exporters that do not export more than Eur 25,000/year. Dependent variable is log labor productivity growth measured as value added per worker from year *t-1* to year *t*. When the dependent variable is tested for the rest of the periods only in *t+2 and t+3* another correlation becomes higher than 0.500, wage and capital (0.5). When correlations are calculated with new micro-exporters that do not export more than Eur 25,000/year, there are no additional correlations higher than 0.500 and the results remain highly consistent.

Addendum a4

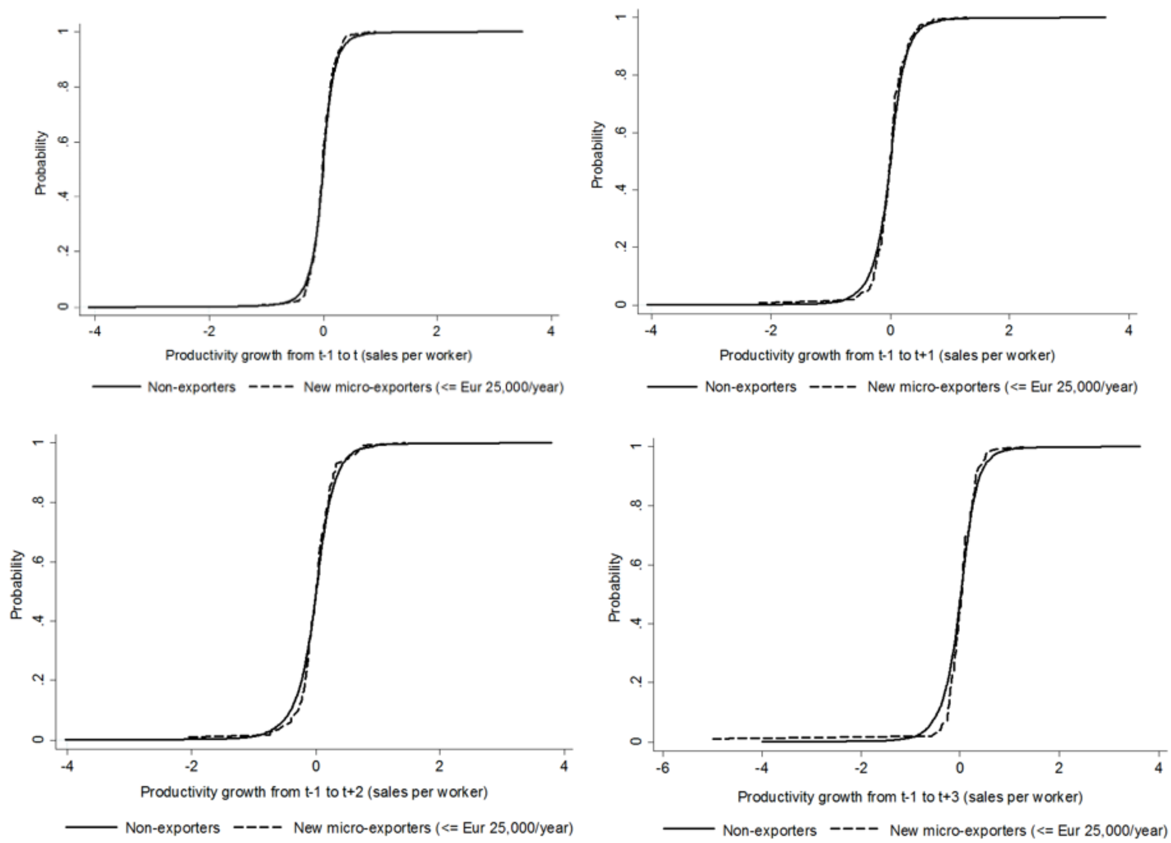
If there is a productivity growth difference between new micro-exporters and non-exporters after starting to export, as predicted by the LBE effect, which reflects a learning process at work with the exporting activity, the labor productivity growth distribution of new micro-exporters must dominate the labor productivity growth distribution of non-exporters based on the concept of first order stochastic dominance to establish a ranking for both groups (Máñez et al., 2009).

Being F and G the cumulative labor productivity growth distribution functions for both groups of firms, first order stochastic dominance of F relative to G is defined by the following condition: $F(z) - G(z) \leq 0$ being $Z_1,...,Z_n$ a random sample of size *n* which corresponds to a group of firms from the distribution function F (new micro-exporters) and $Z_{n+1},...,Z_{n+m}$ a random sample of size *m*, independent of the first one, which corresponds to a different group of firms from the distribution function G (non-exporters), where Z_i represents the labor productivity growth level of firm *i* (Delgado et al., 2002). This distribution comparison does not make any specific assumption about the form of the interdependence between productivity growth and exports unlike regression analysis (Cassiman et al., 2010).

To illustrate the comparisons between two different groups of new micro-exporters, those which do not export more than Eur 25,000/year and those which do not export more than Eur 50,000/year, versus non-exporters, figure a9 to figure a12 report estimators of the labor productivity growth distribution functions for three consecutive years after starting to export (*t-1* to *t*, *t-1* to *t+1*, *t-1* to *t+2* and *t-1* to *t+3*), measured as sales per worker growth and value added per worker growth, for a visual comparisons between the two groups of new micro-exporters versus non-exporters.

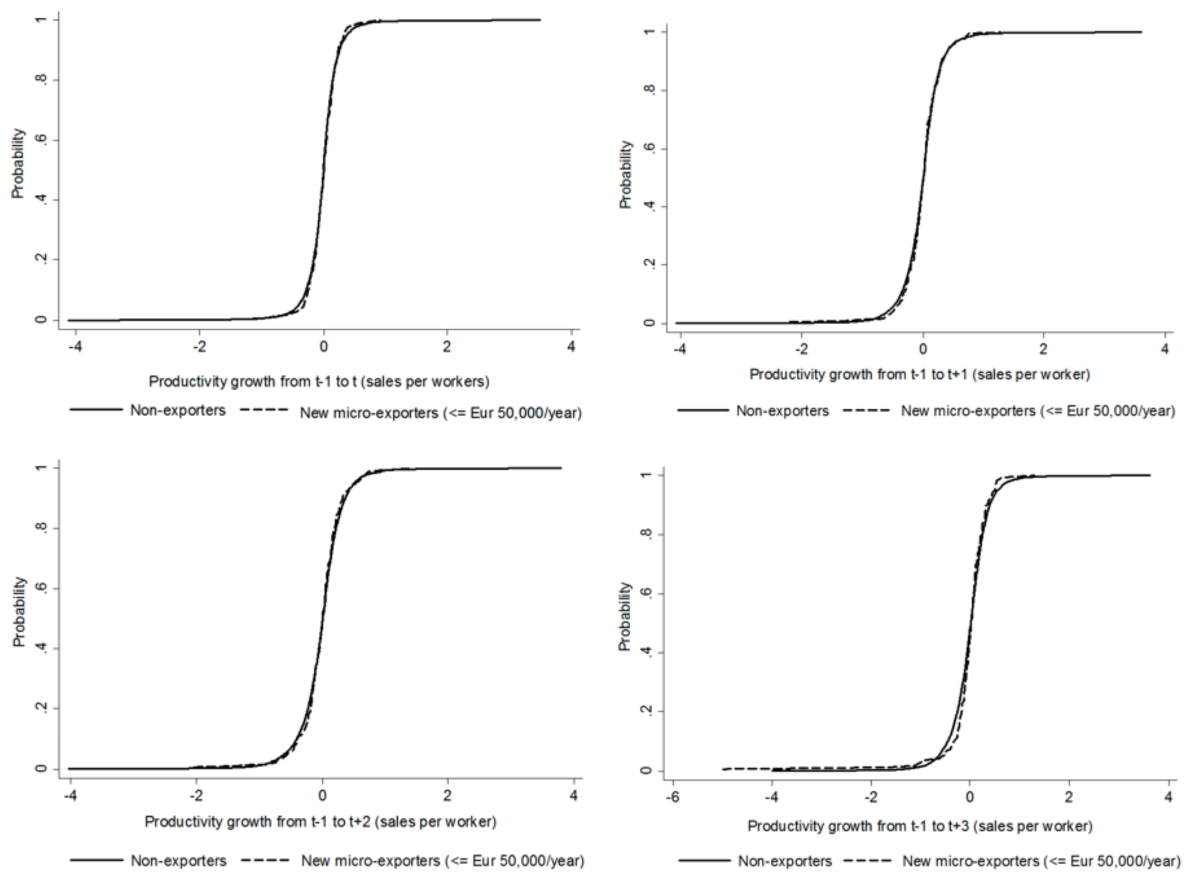
From figure a9 to figure a12 it can be derived that the labor productivity growth distribution of new micro-exporters does not stochastically dominate the labor productivity growth distribution of non-exporting firms for any period (*t*, *t+1*, *t+2* and *t+3*), supporting the hypothesis that new micro-exporters do not experience higher productivity growths than non-exporters after starting to export, while these results present evidence against the existence of a LBE effect for micro-exporters, even in the long term.

Figure a9. Labor productivity growth differences for a group of new micro-exporters versus non-exporters (cumulative distribution function) for four consecutive years, sales per worker growth as productivity level for the LBE effect



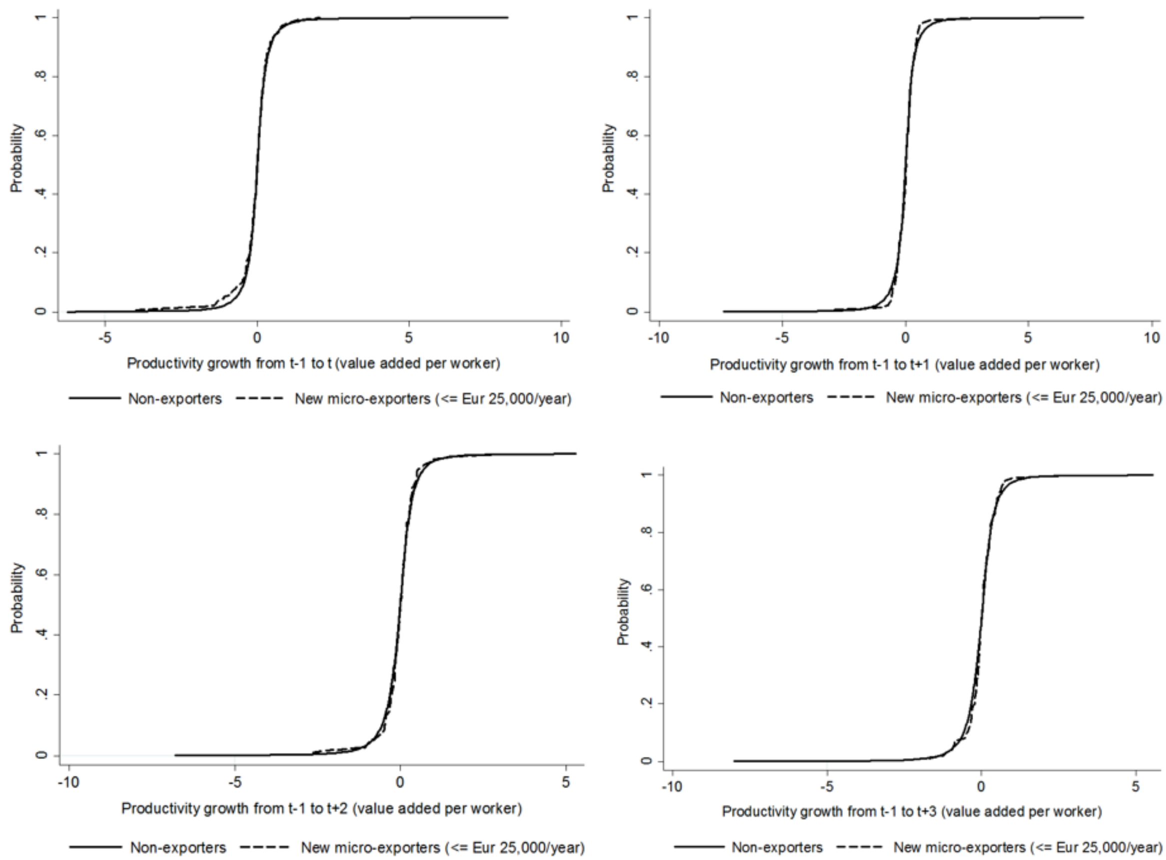
Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Figure a10. Labor productivity growth differences for a group of new micro-exporters versus non-exporters (cumulative distribution function) for four consecutive years, sales per worker growth as productivity level for the LBE effect



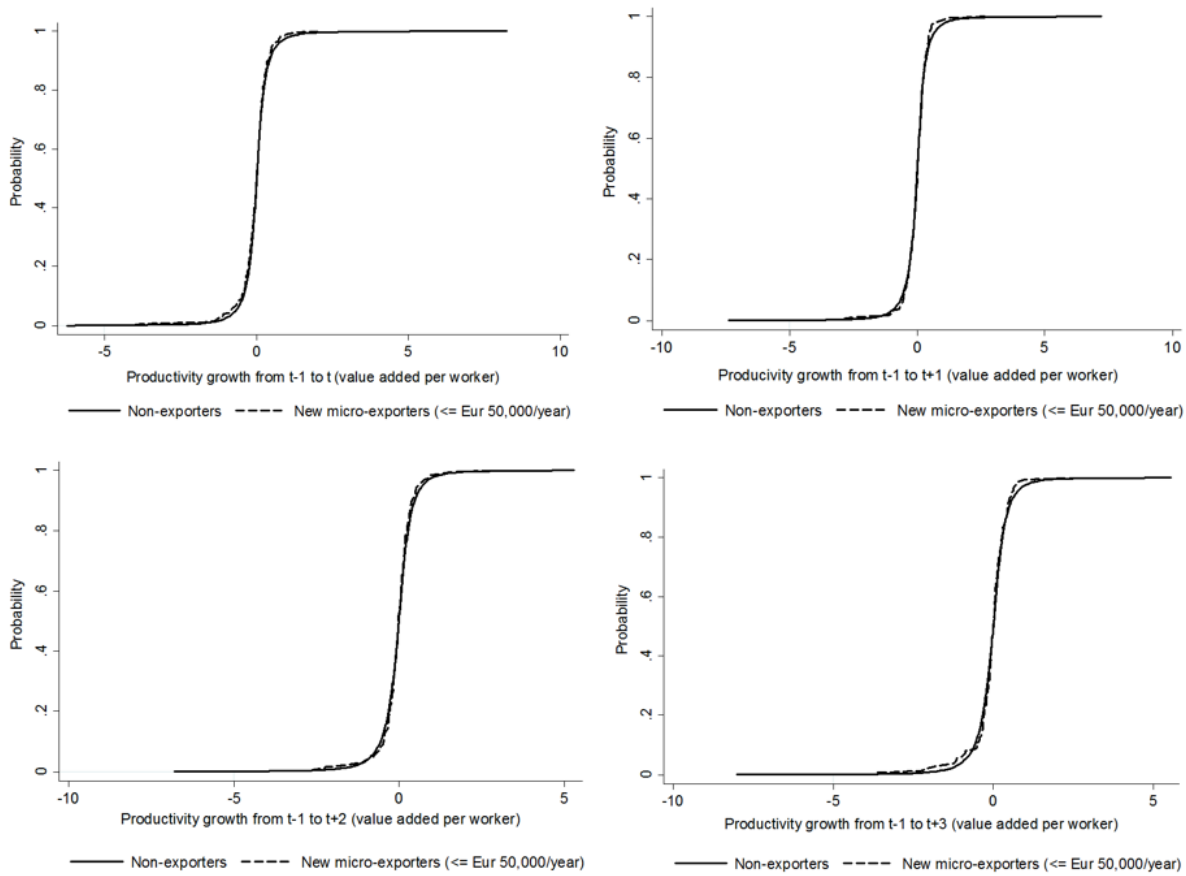
Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Figure a11. Labor productivity growth differences for a group of new micro-exporters versus non-exporters (cumulative distribution function) for four consecutive years, value added per worker growth as productivity level for the LBE effect



Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Figure a12. Labor productivity growth differences for a group of new micro-exporters versus non-exporters (cumulative distribution function) for four consecutive years, value added per worker growth as productivity level for the LBE effect



Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All information where a firm reports a year of creation later than the year the information is reported or where the information about its export status and the value exported is not congruent, is discarded. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010.

Table a25. OLS robust regression with fixed effects, dependent variable sales per worker growth and marketing intensity as control variable for the LBE effect

Variable	New micro-exporter <= €25,000			
	LBE year t	**LBE year t+1**	**LBE year t+2**	**LBE year t+3**
Status $_t$	-.014	.019	.033	.067
	(-0.54)	(0.55)	(0.77)	(1.48)
Productivity $_{t-1}$	-.559***	-.723***	-.812***	-.891***
	(-21.32)	(-24.96)	(-27.84)	(-35.21)
Age $_t$	-.063**	-.073*	-.100**	-.111**
	(-2.16)	(-1.86)	(-2.10)	(-2.04)
Size $_t$	-.092***	-.058**	-.033	-.015
	(-4.40)	(-2.41)	(-1.29)	(-0.52)
Wage $_t$	.403***	.128***	.029	.018
	(14.65)	(3.75)	(0.83)	(0.42)
Capital $_t$	.037***	.019*	.012	-.000
	(4.38)	(1.79)	(1.00)	(-0.01)
Foreign $_t$	.029	-.002	-.020	-.076
	(0.63)	(-0.03)	(-0.28)	(-0.89)
Marketing $_t$	.059**	.066*	.077**	.051
	(2.08)	(1.92)	(2.14)	(1.38)
Constant	2.328***	6.784***	8.951***	10.080***
	(6.22)	(13.55)	(19.52)	(20.42)
Year and industry effect	Included	Included	Included	Included
N	1,842	1,640	1,433	1,211
Observations	11,475	9,900	8,536	7,392
Adj. R squared	0.3384	0.4330	0.5183	0.5930

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a26. OLS robust regression with fixed effects, dependent variable sales per worker growth and marketing intensity as control variable for the LBE effect

Variable	New micro-exporter <= €50,000			
	LBE year t	**LBE year t+1**	**LBE year t+2**	**LBE year t+3**
Status $_t$	.015	.039	.020	.025
	(0.68)	(1.29)	(0.52)	(0.60)
Productivity $_{t-1}$	-.556***	-.719***	-.808***	-.890***
	(-21.36)	(-25.07)	(-27.86)	(-34.98)
Age $_t$	-.062**	-.070*	-.097**	-.103*
	(-2.14)	(-1.83)	(-2.07)	(-1.90)
Size $_t$	-.090***	-.057**	-.031	-.014
	(-4.38)	(-2.39)	(-1.23)	(-0.49)
Wage $_t$	.401***	.130***	.031	.019
	(14.68)	(3.85)	(0.89)	(0.46)
Capital $_t$	.0387***	.019*	.013	-.000
	(4.47)	(1.85)	(1.10)	(-0.03)
Foreign $_t$	.029	.000	-.024	-.084
	(0.64)	(0.00)	(-0.34)	(-0.95)
Marketing $_t$	.059**	.066*	.075**	.051
	(2.08)	(1.93)	(2.12)	(1.39)
Constant	2.308***	7.103***	9.076***	9.810***
	(6.23)	(13.16)	(19.51)	(18.78)
Year and industry effect	Included	Included	Included	Included
N	1,891	1,687	1,470	1,241
Observations	11,580	9,994	8,612	7,456
Adj. R squared	0.3369	0.4308	0.5165	0.5915

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * $p < .10$ (two-tailed tests), ** $p < .05$ (two-tailed tests), *** $p < .01$ (two-tailed tests).

Table a27. OLS robust regression with fixed effects, dependent variable value added per worker growth and marketing intensity as control variable for the LBE effect

Variable	New micro-exporter <= €25,000			
	LBE year t	**LBE year t+1**	**LBE year t+2**	**LBE year t+3**
Status $_t$	.038	-.023	.102	.085
	(0.70)	(-0.36)	(1.50)	(1.31)
Productivity $_{t-1}$	-.891***	-1.000***	-1.004***	-1.016***
	(-40.32)	(-52.95)	(-46.06)	(-49.93)
Age $_t$	-.028	-.000	.023	-.005
	(-0.75)	(-0.01)	(0.44)	(-0.09)
Size $_t$	.006	.044	.027	.048
	(0.23)	(1.48)	(0.92)	(1.45)
Wage $_t$	.715***	.313***	.143***	.080*
	(15.33)	(6.70)	(3.07)	(1.70)
Capital $_t$	.030*	.016	.005	-.001
	(1.91)	(1.06)	(0.41)	(-0.05)
Foreign $_t$	-.076	-.017	-.018	-.131**
	(-1.39)	(-0.25)	(-0.27)	(-2.09)
Marketing $_t$	.078	.097**	.082	.086
	(1.45)	(2.06)	(1.26)	(1.53)
Constant	2.372***	6.851***	8.603***	9.173***
	(4.23)	(13.06)	(16.00)	(16.69)
Year and industry effect	Included	Included	Included	Included
N	1,826	1,618	1,405	1,190
Observations	11,211	9,640	8,293	7,181
Adj. R squared	0.4383	0.4779	0.5045	0.5267

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a28. OLS robust regression with fixed effects, dependent variable value added per worker growth and marketing intensity as control variable for the LBE effect

Variable	New micro-exporter <= €50,000			
	LBE year t	LBE year t+1	LBE year t+2	LBE year t+3
Status $_t$	.027	.012	.083	.048
	(0.60)	(0.24)	(1.59)	(0.92)
Productivity $_{t-1}$	-.890***	-1.000***	-1.002***	-1.016***
	(-40.73)	(-53.09)	(-46.19)	(-49.84)
Age $_t$	-.025	.003	.022	.008
	(-0.69)	(0.07)	(0.45)	(0.14)
Size $_t$	.006	.044	.029	.047
	(0.21)	(1.50)	(0.98)	(1.45)
Wage $_t$	.717***	.322***	.148***	.080*
	(15.43)	(6.92)	(3.18)	(1.68)
Capital $_t$	.028*	.012	.007	-.001
	(1.83)	(0.83)	(0.56)	(-0.08)
Foreign $_t$	-.076	-.012	-.022	-.143**
	(-1.41)	(-0.18)	(-0.32)	(-2.23)
Marketing $_t$	.077	.098**	.082	.089
	(1.43)	(2.08)	(1.26)	(1.58)
Constant	2.355***	6.793***	8.500***	9.130***
	(4.23)	(12.99)	(15.99)	(16.59)
Year and industry effect	Included	Included	Included	Included
N	1,874	1,666	1,441	1,218
Observations	11,314	9,733	8,367	7,242
Adj. R squared	0.4359	0.4782	0.5035	0.5273

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * $p < .10$ (two-tailed tests), ** $p < .05$ (two-tailed tests), *** $p < .01$ (two-tailed tests).

Table a29. OLS robust regression with fixed effects, dependent variable sales per worker growth with augmented group of non-exporters for the LBE effect

Variable	New micro-exporters <= €25,000		
	LBE year t	**LBE year t+1**	**LBE year t+2**
Status $_t$	.007	-.007	.024
	(0.21)	(-0.20)	(0.65)
Productivity $_{t-1}$	-.556***	-.725***	-.809***
	(-21.63)	(-26.30)	(-29.48)
Age $_t$	-.057**	-.068*	-.094**
	(-2.07)	(-1.84)	(-2.11)
Size $_t$	-.086***	-.049**	-.030
	(-4.39)	(-2.16)	(-1.23)
Wage $_t$	.400***	.129***	.033
	(14.97)	(4.00)	(0.96)
Capital $_t$	.034***	.019*	.011
	(4.24)	(1.94)	(0.96)
Foreign $_t$	.019	-.015	-.007
	(0.43)	(-0.27)	(-0.11)
Innovation $_t$	.074***	.058**	.064**
	(3.02)	(2.24)	(2.06)
Constant	1.782***	6.723***	8.847***
	(4.92)	(14.64)	(20.49)
Year and industry effect	Included	Included	Included

N	1,951	1,757	1,548
Observations	12,184	10,562	9,160
Adj. R squared	0.3341	0.4362	0.5231

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a30. OLS robust regression with fixed effects, dependent variable sales per worker growth with augmented group of non-exporters for the LBE effect

Variable	New micro-exporters <= €50,000		
	LBE year t	**LBE year t+1**	**LBE year t+2**
Status $_t$	.041	.039	.013
	(1.62)	(1.40)	(0.44)
Productivity $_{t-1}$	-.552***	-.720***	-.806***
	(-21.67)	(-26.41)	(-29.55)
Age $_t$	-.055**	-.065*	-.093**
	(-2.01)	(-1.78)	(-2.10)
Size $_t$	-.085***	-.049**	-.029
	(-4.38)	(-2.17)	(-1.22)
Wage $_t$	.398***	.130***	.033
	(14.99)	(4.05)	(0.99)
Capital $_t$	.035***	.020**	.012
	(4.35)	(2.01)	(1.05)
Foreign $_t$	.017	-.016	-.010
	(0.38)	(-0.28)	(-0.16)
Innovation $_t$	.075***	.060**	.065**
	(3.03)	(2.25)	(2.08)
Constant	2.311***	7.007***	9.271***
	(6.45)	(14.20)	(19.96)
Year and industry effect	Included	Included	Included
N	1,988	1,791	1,574
Observations	12,289	10,656	9,236
Adj. R squared	0.3324	0.4337	0.5222

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a31. OLS robust regression with fixed effects, dependent variable value added per worker growth with augmented group of non-exporters for the LBE effect

Variable	New micro-exporters <= €25,000		
	LBE year t	LBE year t+1	LBE year t+2
Status $_t$	.039	-.021	.059
	(0.83)	(-0.36)	(1.03)
Productivity $_{t-1}$	-.902***	-.991***	-1.004***
	(-41.05)	(-51.89)	(-49.14)
Age $_t$	-.018	.006	.012
	(-0.52)	(0.14)	(0.25)
Size $_t$	.003	.048*	.032
	(0.12)	(1.66)	(1.11)
Wage $_t$	.721***	.300***	.156***
	(16.19)	(6.64)	(3.48)
Capital $_t$	.025*	.017	.008
	(1.67)	(1.26)	(0.65)
Foreign $_t$	-.074	-.043	.007
	(-1.34)	(-0.64)	(0.11)
Innovation $_t$	-.020	-.008	.062
	(-0.50)	(-0.23)	(1.37)
Constant	2.458***	6.800***	8.560***
	(4.56)	(12.97)	(16.67)
Year and industry effect	Included	Included	Included
N	1,931	1,736	1,518
Observations	11,897	10,286	8,897
Adj. R squared	0.4392	0.4722	0.5173

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a32. OLS robust regression with fixed effects, dependent variable value added per worker growth with augmented group of non-exporters for the LBE effect

Variable	New micro-exporters <= €50,000		
	LBE year t	**LBE year t+1**	**LBE year t+2**
Status $_t$	.056	.020	.039
	(1.41)	(0.41)	(0.91)
Productivity $_{t-1}$	-0.899***	-0.988***	-1.004***
	(-41.60)	(-51.13)	(-49.61)
Age $_t$	-.014	.007	.010
	(-0.39)	(0.15)	(0.21)
Size $_t$	.004	.049*	.033
	(0.14)	(1.70)	(1.17)
Wage $_t$	.720***	.305***	.158***
	(16.30)	(6.68)	(3.53)
Capital $_t$	.025*	.015	.010
	(1.66)	(1.07)	(0.82)
Foreign $_t$	-.077	-.042	.009
	(-1.41)	(-0.63)	(0.14)
Innovation $_t$	-.019	-.006	.061
	(-0.45)	(-0.16)	(1.33)
Constant	2.405***	6.793***	8.515***
	(4.50)	(13.24)	(16.75)
Year and industry effect	Included	Included	Included
N	1,968	1,770	1,544
Observations	12,000	10,379	8,971
Adj. R squared	0.4370	0.4705	0.5169

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a33. OLS robust regression with fixed effects, dependent variable sales per worker growth and control variable wage per hour worked for the LBE effect

Variable	New micro-exporter <= €25,000			
	LBE year t	**LBE year t+1**	**LBE year t+2**	**LBE year t+3**
Status $_t$	-.010	.020	.033	.068
	(-0.40)	(0.57)	(0.77)	(1.51)
Productivity $_{t-1}$	-.549***	-.708***	-.811***	-.891***
	(-20.86)	(-25.73)	(-27.66)	(-35.46)
Age $_t$	-.063**	-.074*	-.100**	-.113**
	(-2.17)	(-1.89)	(-2.10)	(-2.08)
Size $_t$	-.099***	-.063***	-.035	-.016
	(-4.64)	(-2.62)	(-1.38)	(-0.54)
Wage/hour $_t$	.334***	.091***	.009	.018
	(11.79)	(2.83)	(0.27)	(0.44)
Capital $_t$	.039***	.017*	.013	-.001
	(4.51)	(1.68)	(1.05)	(-0.04)
Foreign $_t$	.017	-.014	-.030	-.085
	(0.35)	(-0.24)	(-0.43)	(-1.06)
Innovation $_t$	.066**	.070**	.067*	.090*
	(2.46)	(2.47)	(1.83)	(1.95)
Constant	4.355***	8.310***	9.207***	10.224***
	(11.92)	(25.55)	(26.11)	(30.29)
Year and industry effect	Included	Included	Included	Included
N	1,836	1,633	1,428	1,208
Observations	11,441	9,876	8,519	7,379
Adj. R squared	0.3232	0.4281	0.5158	0.5908

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a34. OLS robust regression with fixed effects, dependent variable sales per worker growth and control variable wage per hour worked for the LBE effect

Variable	New micro-exporter <= €50,000			
	LBE year t	**LBE year t+1**	**LBE year t+2**	**LBE year t+3**
Status $_t$	.018	.039	.019	.025
	(0.80)	(1.29)	(0.51)	(0.61)
Productivity $_{t-1}$	-.546***	-.704***	-.807***	-.890***
	(-20.90)	(-25.87)	(-27.68)	(-35.24)
Age $_t$	-.062**	-.072*	-.097**	-.105*
	(-2.15)	(-1.87)	(-2.07)	(-1.94)
Size $_t$	-.097***	-.061***	-.033	-.015
	(-4.64)	(-2.61)	(-1.33)	(-0.51)
Wage/hour $_t$	.333***	.093***	.012	.018
	(11.81)	(2.92)	(0.34)	(0.46)
Capital $_t$	.039***	.017*	.014	-.001
	(4.57)	(1.74)	(1.14)	(-0.05)
Foreign $_t$	.018	-.011	-.034	-.093
	(0.38)	(-0.20)	(-0.50)	(-1.12)
Innovation $_t$	.067**	.070**	.067*	.094**
	(2.48)	(2.46)	(1.83)	(1.98)
Constant	4.312***	8.235***	9.368***	9.950***
	(12.13)	(25.74)	(26.10)	(26.28)
Year and industry effect	Included	Included	Included	Included
N	1,884	1,679	1,465	1,238
Observations	11,545	9,969	8,595	7,443
Adj. R squared	0.3217	0.4260	0.5140	0.5893

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a35. OLS robust regression with fixed effects, dependent variable value added per worker growth and control variable wage per hour worked for the LBE effect

Variable	New micro-exporter <= €25,000			
	LBE year t	**LBE year t+1**	**LBE year t+2**	**LBE year t+3**
Status $_t$	.039	-.022	.101	.085
	(0.70)	(-0.35)	(1.48)	(1.31)
Productivity $_{t-1}$	-.885***	-.994***	-1.002***	-1.017***
	(-38.97)	(-51.78)	(-45.76)	(-49.87)
Age $_t$	-.028	-.003	.022	-.006
	(-0.75)	(-0.06)	(0.43)	(-0.10)
Size $_t$	-.001	.041	.026	.050
	(-0.03)	(1.38)	(0.88)	(1.50)
Wage/hour $_t$	.618***	.255***	.113***	.089**
	(13.45)	(5.58)	(2.60)	(1.98)
Capital $_t$	.033**	.017	.008	-.001
	(2.10)	(1.16)	(0.59)	(-0.07)
Foreign $_t$	-.098	-.020	-.022	-.134**
	(-1.62)	(-0.27)	(-0.30)	(-2.04)
Innovation $_t$	-.015	.018	.024	.040
	(-0.33)	(0.44)	(0.52)	(0.78)
Constant	2.968***	7.572***	8.937***	9.139***
	(5.31)	(15.29)	(18.34)	(17.95)
Year and industry effect	Included	Included	Included	Included
N	1,820	1,610	1,400	1,187
Observations	11,180	9,617	8,277	7,169
Adj. R squared	0.4295	0.4745	0.5035	0.5256

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

Table a36. OLS robust regression with fixed effects, dependent variable value added per worker growth and control variable wage per hour worked for the LBE effect

Variable	New micro-exporter <= €50,000			
	LBE year t	**LBE year t+1**	**LBE year t+2**	**LBE year t+3**
Status $_t$	.028	.013	.083	.048
	(0.61)	(0.25)	(1.58)	(0.92)
Productivity $_{t-1}$	-.884***	-.994***	-1.001***	-1.016***
	(-39.36)	(-51.91)	(-45.88)	(-49.78)
Age $_t$	-.025	.001	.022	.007
	(-0.68)	(0.02)	(0.43)	(0.12)
Size $_t$	-.002	.041	.027	.049
	(-0.06)	(1.39)	(0.94)	(1.50)
Wage/hour $_t$	.620***	.263***	.119***	.089**
	(13.54)	(5.77)	(2.74)	(1.97)
Capital $_t$	.031**	.014	.009	-.002
	(2.00)	(0.93)	(0.74)	(-0.10)
Foreign $_t$	-.097	-.015	-.025	-.147**
	(-1.64)	(-0.20)	(-0.35)	(-2.19)
Innovation $_t$	-.015	.019	.024	.046
	(-0.34)	(0.47)	(0.51)	(0.89)
Constant	3.002***	7.536***	8.822***	9.090***
	(5.72)	(15.27)	(18.14)	(17.78)
Year and industry effect	Included	Included	Included	Included
N	1,867	1,657	1,436	1,215
Observations	11,282	9,709	8,351	7,230
Adj. R squared	0.4271	0.4748	0.5025	0.5262

Source: Own elaboration with unbalanced panel data from the ESEE for the period 1990-2015. All monetary values are calculated on a yearly basis in euros and reported in constant values deflated by the IPRI, base year 2010. t-statistics appear in parentheses, * p < .10 (two-tailed tests), ** p < .05 (two-tailed tests), *** p < .01 (two-tailed tests).

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Conclusions

CONCLUSIONS

1. The exporter premium

The New New Trade Theory (NNTT) which began with the seminal paper of Bernard and Jensen (1995) has as a stylized fact that exporters have superior performance characteristics, specifically a higher productivity level, than non-exporters, better known as the exporter premium. The exporter premium is a consequence of the most productive firms self-selecting themselves into the export market given the existence of high export entry costs, known as the self-selection (SS) effect and a consequence of a learning mechanism triggered by the export activity which improves firm's productivity through the acquisition of new techniques and technologies from foreign agents, known as the learning by exporting (LBE) effect. However, recently, the NNTT literature has found that countries have granular export structures with an extreme concentration of trade across few large and highly productive firms which coexist with a large number of smaller and lower productive firms which in turn, export very little (Freund and Pierola, 2015; Lucio et al., 2017; Bernard et al., 2018), contradicting the NNTT idea that exporters are a minority of firms with good performance characteristics.

To explain this apparent contradiction this thesis proposes a conceptual framework where small firms with low productivity and few internal resources access the international market by selecting export entry strategies which reduce the export entry cost to a negligible level but which severely limit the exported volume, becoming micro-exporters. Given their low productivity levels and the negligible export entry cost attained, micro-exporters are no longer subject to the SS effect nor the LBE effect and, as a consequence, the exporter premium does not apply to them. Accordingly, this thesis proposes the postulate that there is no productivity difference between micro-exporters and non-exporters and puts forward the hypothesis that micro-exporters do not have higher productivity levels than non-exporters.

H1: Micro-exporters are no more productive than non-exporters

With an unbalanced panel data of more than 1,800 Spanish manufacturing firms per year for the period 1990-2015, this thesis contests the existence of the exporter premium among micro-exporters by supporting the aforementioned hypothesis with descriptive analyses (unconditional mean), regression tests (conditional mean) and non-parametric tests (distribution analysis).

Complementarily, this thesis proposes that the general consensus on the exporter premium might be explained by the existence of a large-firm overrepresentation bias in the databases employed by the NNTT empirical literature (Bernard and Jensen, 1995; ISGEP, 2008; Mayer and Ottaviano, 2008). Owing to the fact that large firms tend to be more productive and become larger exporters compared to small firms, any test which employs biased firm-level databases obtains biased results which embody the export dynamics of large exporters such as the exporter premium. This large-firm overrepresentation bias is documented in the most renowned Spanish firm-level database and when the bias is accounted for, and micro-exporters are analyzed isolated from the bulk of exporters, the results show that micro-exporters have no better performance characteristics and, more specifically, have no better labor productivity than non-exporters, contradicting the existence of the exporter premium for this group of exporters. However, the performed analysis on the exporter premium for micro-exporters is not free from limitations because the sample of firms only includes one country (Spain) and there are only manufacturing firms.

The implications that the exporter premium does not affect micro-exporters suggest that managers and owners of small firms must be very down-to-earth about their expectations on the international ventures, as most likely export volumes will be low and the export experience short-lived, discouraging many firms from keeping on exporting. Small firms which are close to the productivity export entry/exit threshold are less likely to be able to compete effectively in the foreign market for long periods of time. Such firms like micro-exporters, are likely to present an intermittent behavior as for them exporting it is often a marginal exercise which is easily reversed rather than a gradual process of increasing learning and commitment to the export market (Crick, 2003; Bernini et at., 2016).

Furthermore, because small firms are at a disadvantage when competing abroad, due to the complexity of the international business environment and their comparative scarcity of internal resources, public intervention is often justified because it targets small firms to help them to absorb part of the export entry cost and facilitate their access to the export market by reducing the entry barriers (Fernandez and Nieto, 2005; Leonidou et al., 2015). However, export promotion programs (EPP) must not be targeted at potential micro-exporters given that they would not significantly benefit from the export experience. As a rule of thumb, firms with few employees, low labor productivity and little investment in research and development (R&D) and marketing compared to their peers, should be regarded as potential micro-exporters and carefully examined by EPPs before granting them any type of support.

To conclude, the analysis of the exporter premium on micro-exporters opens the door for further research in several directions such as testing the conceptual framework for micro-exporters in different countries other than Spain and different productive sectors other than manufacturing, as well as the use of case studies on micro-exporters to further understand how these small firms operate in the international market.

2. The self-selection effect

To explain the exporter premium the NNTT proposes the existence of the SS effect, a mechanism whereby only the most productive firms self-select themselves into the export market, given the high productivity levels required to absorb the extra cost associated with entry into exports such as market research, developing new distribution networks and the likes (Melitz, 2003). At the same time, the high export entry cost increases the export persistence as it works as an incentive for exporters to keep on exporting and thus avoid paying the re-entry cost when they exit and reenter the export market, an effect known as export hysteresis (Baldwin, 1988).

Nonetheless, more recently the NNTT literature has found that many firms export tiny amounts with high turnover rates in and out of the export market (Crick, 2004; Welch and Welch, 2009; Blum et al., 2013; Bernini et at., 2016). This contradicts to some extent the general consensus on the existence of high export entry costs, the SS effect and the export hysteresis (Wagner, 2007; ISGEP, 2008; Wagner, 2012), as firms with tiny exports will not find it profitable to absorb the high export entry cost and they will not have additional incentives to keep on exporting.

To explain these inconsistencies this thesis proposes an export entry conceptual framework where firms with low productivity and scarce resources access the international market by selecting export entry strategies which reduce the export entry cost to a negligible level. This includes exporting to an existing product to a gravitational market through a distributor, whilst it also severely limit the volume exported, becoming micro-exporters. Given the negligible export entry costs attained micro-exporters are neither subject to the SS effect nor to the export hysteresis. Accordingly, this thesis proposes the idea that there is no productivity differences between new micro-exporters and non-exporters before they enter the international market and brings forward the hypothesis that new micro-exporters do not have higher productivity levels compared with non-exporters before starting to export.

H2: New micro-exporters do not have higher productivity levels than non-exporters before starting to export

With an unbalanced panel data of Spanish manufacturing firms for the period 1990-2015 this thesis contests the existence of the SS effect among micro-exporters by supporting the aforementioned hypothesis with descriptive analyses (unconditional mean), regression tests (conditional mean) and non-parametric tests (distribution analysis). Furthermore, this thesis examines additional export entry data which supports the idea that micro-exporters export existing products with no adaptations to gravitational markets through international distributors (or serving direct orders from foreign clients) more often than large exporters.

The results obtained show that micro-exporters have no better performance characteristics and specifically, no better labor productivity than non-exporters before starting to export. Thus contradicting the existence of the SS effect for this group of exporters. The export entry conceptual framework for micro-exporters complements the latest developments in the NNTT literature. For instance, the new export dynamics where new exporters often start by exporting small amounts usually consisting of one product to one country, by incurring in small export entry costs and, conditional on continuing the export activity, gradually increase the amount exported and the associated export entry cost (Albornoz et al., 2012; Eslava et al., 2015; Ruhl and Willis, 2017). Yet, the performed analysis on the SS effect for micro-exporters is not free from limitations as the sample of firms used for testing only includes one country (Spain) and only the manufacturing sector, and the database does not give detailed data on the export entry strategies followed by new exporters.

The implications of the lack of a SS effect among micro-exporters into exports mean that (almost) all firms can access the international market if they select the appropriate export entry strategies, but (most) with few possibilities of survival. In this regard, the proposed export entry conceptual framework offers some insight for managers and owners of small firms on what causes and what consequences might be behind some export entry decisions which they can take into consideration when selecting their own export entry strategies. Because the export entry cost is no longer a major impediment to access the export market, the internationalization strategy of small firms should shift its focus from how to enter the export market to how to benefit from the export activity. If managers and owners are not sure of what are the potential gains from the export activity, perhaps it is best not to invest their scarce resources to venture into the international market where, most likely, the firm will be expelled early due to its lack of competitiveness.

Conceptually, traditional EPPs facilitate the entry into exports of small firms by reducing their sunk/fixed costs of exporting through the services of an export promotion agency (EPA) which centralizes certain export entry costs and spreads these costs over many firms, which otherwise could not recover the export entry cost (Fernandez and Nieto, 2005; Leonidou et al., 2015; Much and Schaur, 2018). However, the conceptual export entry framework does not support a deterministic approach to the export entry cost, owing to the fact that the entry cost is endogenous to the firm's export entry strategy based on its internal capabilities and resources. Therefore, the existence of an export entry cost is no longer a valid answer to the question why some firms export while others do not. EPPs should be reoriented from facilitating the access to the export market, which is no longer seen as a major hurdle, but rather to facilitate firms obtaining gains from the export activity. EPPs should evolve from purely subsidizing the export entry cost to facilitate the growth of the productivity and foreign demand of small exporters in order to enable small firms to compete effectively within the export market.

To finalize, the analysis of the SS effect on micro-exporters opens the door for further research in several directions. These could include testing the export entry conceptual framework for micro-exporters in different countries other than Spain and different productive sectors other than manufacturing, including the use of case studies on micro-exporters to further understand the causes and consequences behind the strategies employed by these small firms to access the international market.

3. The learning by exporting effect

Additionally to the SS effect, in order to explain the exporter premium, the NNTT literature proposes the existence of a LBE effect by which firms improve their productivity after entering the international market triggered by a learning process about innovation, management, production, quality and technology stimulated by the interaction with international customers and competitors. However, there is not yet a consensus on the existence of the LBE effect as it seems to be present only for some countries, for some industries and for some firms (Wagner 2007; ISGEP, 2008; Martins and Yang, 2009; Wagner, 2012).

To circumvent any controversy around the existence of the LBE effect, this thesis proposes an export entry conceptual framework where small firms with low productivity and scarce resources access the international market by selecting export entry strategies which reduce the export entry cost to a negligible level but severely limit the volume exported, becoming micro-exporters. Furthermore, given the export entry strategies followed by new micro-exporters, they do not obtain significant LBE productivity gains as they do not commit enough personnel, time or other internal resources to learn from international markets, assimilate this knowledge and implement it through the adoption of new products, technologies and skills which in turn yield a positive effect on productivity (Clerides et al., 1998, Manjón et al., 2013). The absence of positive LBE effects on productivity and the negligible export entry cost attained by micro-exporters deters any export hysteresis and explains the lack of competitiveness in the export market, the short life span of the international venture and the low export persistence among micro-exporters which experience high turnover rates in and out of the export activity (Roberts and Tybout, 1997).

Due to the fact that micro-exporters are unable to enjoy significant LBE productivity gains through their export activity this thesis propounds that there is no productivity growth differences between new micro-exporters and non-exporters after entry into exports. Thus proposing the hypothesis that new micro-exporters do not experience higher productivity growths that non-exporters after starting to export.

H3: New micro-exporters do not experience higher productivity growths than non-exporters after starting to export

With an unbalanced panel data of more than 1,800 Spanish manufacturing firms per year for the period 1990-2015, this thesis contests the existence of the LBE effect among micro-exporters by supporting the aforementioned hypothesis with descriptive analyses (unconditional mean), regression tests (conditional mean) and non-parametric tests (distribution analysis). Moreover, this thesis studies additional export firm-level data which sustains the export entry conceptual framework where micro-exporters experience very low levels of export intensity and export persistence, as well as quick entries and exits from the international market without export hysteresis.

The results are aligned with the proposition where starting to export does not boost the productivity of new micro-exporters, contradicting the existence of the LBE effect for this group of exporters. The conceptual framework and the results obtained do not contradict previous findings of the NNTT literature as it is still hotly debated if the LBE effect exists and, if so, what are its causes and consequences. Rather, it helps to clarify the absence of the LBE effect among micro-exporters. However, the performed analysis on the LBE effect for micro-exporters is not free from limitations as the sample of firms only includes one country (Spain) and only includes the manufacturing sector.

The absence of a LBE effect among micro-exporters entails that exporting is not a lever of riches or productivity on itself but one of the many activities which can support the growth strategy of a firm. Exporting opens an potentially immense new market to exploit economies of scale, accelerate the learning curve process and access new knowledge, technologies and ideas not yet available domestically. Therefore, exporting is just a means to an end and not an end by itself. Thus, owners and managers of small firms must analyze carefully if diverting their scarce resources to the export activity fits into the firm's strategy to capitalize on the LBE effect through well-defined strategies for growth. If micro-exporters are unable to this, they are doomed to perform exports as a marginal activity for the foreseeable future by being expelled early from the export market given their lack of competitiveness, with an irregular export behavior easily reversed that gets them no significant gains from the export activity. In other words, if small firms cannot benefit in a significant way from competing in the international market, they will ultimately be sidetracked by globalization.

If the export activity of micro-exporters is unable to directly improve their productivity or their foreign demand these small firms are likely to exit early from the export market with no significant gains from their export activity. Due to this, EPPs could reorient their assistance programs to increase firms' productivity through R&D support and staff training. By directly promoting productivity, EPPs indirectly facilitate export entry, because more productive firms can absorb higher export entry costs and increase the ability that new exporters can successfully compete in foreign markets (Görg et al., 2008), reach the export tenure required to obtain significant gains from the LBE effect, as well as develop the internal absorptive capacity required to acquire and implement new knowledge and technology from foreign markets in order to boost their productivity.

To conclude, the analysis of the LBE effect on micro-exporters opens the door for further research in several directions. For example, testing the conceptual framework for micro-exporters in different countries other than Spain and different productive sectors other than manufacturing, including the use of case studies on micro-exporters to further understand their export dynamics.

On an ending note, it is possible that during the export entry phase a firm discovers a business opportunity in the international market and completes the order, becoming an exporter. But a considerable period of time (perhaps more than 12 months) elapses between future orders, yet the firm is fully prepared to respond to another international order when and how it presents again. Such cases are difficult to categorize (Welch and Welch, 2009) because the company is undoubtedly a domestic firm with an international spirit which becomes an exporter at different points in time. This may suggest that for a significant number of firms, especially small and medium enterprises (SME) with low productivity and few resources, the continuous and gradual internationalization process, while not incompatible with their export strategies, simply does not occur. Owing to this, the conventional division of companies in two dichotomic groups of exporters versus non-exporters might be conceptually insufficient to classify these small firms which inhabit a grey area between the two categories where opportunistic, intermittent or even accidental exporting is commonplace (Bernini et at., 2016). Perhaps the categorization of micro-exporters is a first step in the right direction.

In a nutshell, this thesis expands the current NNTT literature by incorporating the export dynamics of a neglected group of exporters, the micro-exporters, which every year represent a majority of exporting firms in many countries and proves the great importance of micro-exporters since, at least for the last decade in Spain, they represent more than half of all exporters with an increasing presence among the exporting community. Hence, further investigations on this neglected group of exporters is amply justified and certainly required.

The first step in dealing with poverty was to acknowledge the Pareto principle of income inequality in order to focus on the base of the pyramid, the billions of people living in extreme poverty. Now is the perfect time to embrace the principle of export inequality to focus on the base of a different pyramid, the millions of micro-exporters, *for the building … that rest upon the forgotten*.

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List of acronyms

The acronyms are registered in alphabetical order. Given the extension of this thesis, all acronyms are accompanied in every chapter by the complete constituted words from the first time they are mentioned.

ALS	Asymptotic Least Squares
ASM	Annual Survey of Manufactures
BLUE	Best Linear Unbiased Estimates
CDM	Crépon Duguet and Mairesse
CES	Constant Elasticity of Substitution
CNAE	Clasificación Nacional de Actividades Económicas
DIRCE	Directorio Central de Empresas
EPA	Export Promotion Agency
EPP	Export Promotion Program
ESEE	Encuesta sobre Estrategias Empresariales
EU	European Union
FDI	Foreign Direct Invesment
FOB	Free on Board
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GLS	Generalized Least Squares

GMM	Generalized Method of Moments
GNP	Gross National Product
GPS	Generalized Propensity Score
ICEX	Instituto Español de Comercio Exterior
INE	Instituto Nacional de Estadística
IPRI	Índice de Precios Industriales
ISGEP	International Study Group on Exports and Productivity
LAD	Least Absolute Deviations
LBE	Learning by Exporting
MSME	Micro, Small and Medium Enterprise
NGO	Non-Governmental Organization
NNTT	New New Trade Theory
NTM	Non-Tariff Measure
NTT	New Trade Theory
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PhD	Doctor of Philosophy
PPF	Production Possibility Frontier
PSM	Propensity Score Matching
R&D	Research and Development

RBV	Resource-Based View
ROI	Return on Investment
SME	Small and Medium Enterprise
SS	Self-Selection
TFP	Total Factor Productivity
UK	United Kingdom
US	Unites States
VIF	Variance Inflation Factors
WB	World Bank
WTO	World Trade Organization

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APPENDIX

CONCLUSIONES

1. La prima del exportador

La Nueva Nueva Teoría del Comercio, que comenzó con la pionera publicación de Bernard y Jensen (1995), mantiene como un hecho estilizado que los exportadores tienen mejores características de rendimiento, específicamente un nivel de productividad más alto, que los no exportadores, más conocido como prima del exportador. La prima del exportador es una consecuencia de la autoselección de las empresas más productivas en el mercado de exportación, dada la existencia de altos costes de acceso al mercado internacional, conocido como efecto autoselección, y de un mecanismo de aprendizaje desencadenado por la actividad exportadora que mejora la productividad de las empresas a través de la adquisición de nuevas técnicas y tecnologías procedentes de agentes extranjeros, conocido como efecto aprendizaje por exportación. Sin embargo, recientemente, la Nueva Nueva Teoría del Comercio ha encontrado que los países tienen estructuras de exportación granulares con una concentración extrema del comercio en unas pocas grandes empresas altamente productivas que coexisten con un gran número de empresas más pequeñas y menos productivas que exportan muy poco (Freund y Pierola, 2015; Lucio et al., 2017; Bernard et al., 2018), lo que contradice la idea de la Nueva Nueva Teoría del Comercio donde los exportadores son una minoría de empresas con buenas características de rendimiento.

Para explicar esta aparente contradicción, la tesis propone un marco conceptual en el que las pequeñas empresas con baja productividad y pocos recursos internos acceden al mercado internacional mediante la selección de estrategias de entrada a la exportación que reducen a un nivel significante el costo de acceso a la exportación, pero que limitan severamente el volumen exportado, convirtiéndose en micro-exportadores. Dados sus bajos niveles de productividad y el mínimo coste de acceso a la exportación, los micro-exportadores ya no están sujetos al efecto autoselección ni al efecto aprendizaje por exportación y, por consiguiente, no están afectados por la prima del exportador. Por todo ello, la tesis postula de que no hay ninguna diferencia de productividad entre los micro-exportadores y los no exportadores y propone la hipótesis de que los micro-exportadores no tienen niveles de productividad más altos que los no exportadores.

H1: Los micro-exportadores no son más productivos que los no exportadores

Con datos panel no balanceados de más de 1.800 empresas industriales españolas al año para el periodo 1990-2015, la tesis cuestiona la existencia de la prima del exportador entre los micro-exportadores al apoyar la anterior hipótesis mediante análisis descriptivos (media incondicional), pruebas de regresión (media condicional) y pruebas no paramétricas (análisis de distribución).

Complementariamente, la tesis propone que el consenso general alcanzado sobre la prima del exportador podría explicarse por la existencia de un sesgo de sobrerrepresentación de las grandes empresas en las bases de datos empleadas por la literatura empírica de la Nueva Nueva Teoría del Comercio (Bernard y Jensen, 1995; ISGEP, 2008; Mayer y Ottaviano, 2008). Debido a que las grandes empresas tienden a ser más productivas y a convertirse en grandes exportadores en comparación con las pequeñas empresas, cualquier test que emplee bases de datos sesgadas obtiene resultados sesgados que incorporan la dinámica de exportación de los grandes exportadores, como la prima del exportador. Este sesgo de sobrerrepresentación de grandes empresas está documentado en la base de datos más reconocida de empresas españolas y cuando se tiene en cuenta el sesgo, y se analizan por separado a los micro-exportadores del resto de los exportadores, los resultados muestran que los micro-exportadores no tienen mejores indicadores de rendimiento y, más específicamente, no tienen mejor productividad laboral que los no exportadores, contradiciendo la existencia de la prima del exportador para este grupo de exportadores. Sin embargo, el análisis realizado sobre la prima del exportador para los micro-exportadores no está exento de limitaciones dado que la muestra de empresas empleada sólo incluye un país (España) y sólo empresas industriales.

Las implicaciones de que la prima del exportador no afecte a los micro-exportadores sugieren que los gerentes y propietarios de las pequeñas empresas deben ser muy realistas con sus expectativas sobre el emprendimiento internacional, ya que lo más probable es que los volúmenes de exportación sean bajos y que la experiencia de exportación sea efímera, lo que desalienta a muchas empresas a seguir exportando. Las pequeñas empresas que están cerca del umbral de productividad de entrada y salida a la exportación tienen menos probabilidades de poder competir eficazmente en el mercado exterior durante largos períodos de tiempo. Este tipo de empresas, como los micro-exportadores, es probable que presenten un comportamiento intermitente, ya que para ellas la exportación es a menudo un ejercicio marginal fácilmente reversible, en lugar de un proceso gradual de aumento del aprendizaje y del compromiso con el mercado de exportación (Crick, 2003; Bernini et al., 2016).

Además, dado que las pequeñas empresas se encuentran en desventaja a la hora de competir en el exterior, debido a la complejidad del entorno empresarial internacional y a la relativa escasez de recursos internos, la intervención pública suele estar justificada cuando se orienta en ayudar a las pequeñas empresas para absorber parte de los costes de entrada a la exportación y facilitar su acceso al mercado de internacional mediante la reducción de las barreras de entrada (Fernández y Nieto, 2005; Leonidou et al., 2015). Sin embargo, los programas de promoción a la exportación no deben dirigirse a los posibles micro-exportadores, ya que no se beneficiarán significativamente de la experiencia de exportar. Por regla general, las empresas con pocos empleados, baja productividad laboral y poca inversión en investigación y desarrollo y en marketing, en comparación con sus pares, deben ser consideradas como potenciales micro-exportadores y examinadas cuidadosamente por los programas de promoción a la exportación antes de concederles algún tipo de apoyo.

Para concluir, el análisis de la prima del exportador en los micro-exportadores abre la puerta a nuevas investigaciones en varias direcciones, como el estudio del marco conceptual para los micro-exportadores en países distintos a España y en sectores productivos distintos al industrial, así como la utilización de casos de estudio sobre los micro-exportadores para comprender mejor cómo funcionan estas pequeñas empresas en el mercado internacional.

2. El efecto autoselección

Para explicar la prima del exportador, la Nueva Nueva Teoría de Comercio propone la existencia del efecto autoselección, un mecanismo por el cual sólo las empresas más productivas se autoseleccionan para acceder al mercado de exportación, dados los altos niveles de productividad requeridos para absorber el coste adicional asociado con el inicio a la exportación, tales como la investigación de mercado, el desarrollo de nuevas redes de distribución y similares (Melitz, 2003).

Al mismo tiempo, el alto coste de acceso a la exportación aumenta la persistencia del exportador, al funcionar como un incentivo a que los exportadores sigan exportando y eviten pagar de nuevo el costo de reingreso cuando salen y vuelven a entrar al mercado de exportación, un efecto conocido como histéresis de exportación (Baldwin, 1988).

Sin embargo, más recientemente la literatura de la Nueva Nueva Teoría de Comercio ha encontrado que muchas empresas exportan pequeñas cantidades con una alta rotación de entrada y salida al mercado de exportación (Crick, 2004; Welch y Welch, 2009; Blum et al., 2013; Bernini et al., 2016). Esto contradice en cierto manera el consenso general alcanzando sobre la existencia de altos costes de entrada a la exportación, el efecto autoselección y la histéresis de exportación (Wagner, 2007; ISGEP, 2008; Wagner, 2012), ya que las empresas con volúmenes de exportación pequeños no encontrarán rentable absorber el alto coste de entrada a la exportación y no tendrán incentivos adicionales para seguir exportando.

Para explicar estas inconsistencias, la tesis propone un marco conceptual de acceso a la exportación en el que las empresas con baja productividad y recursos escasos acceden al mercado internacional mediante la selección de estrategias de entrada a la exportación que reducen el coste de acceso a un nivel insignificante. Estas incluyen la exportación de un producto existente a un mercado gravitacional a través de un distribuidor, lo que limita severamente el volumen exportado, convirtiéndose en micro-exportadores. Dado que los costes de entrada al mercado de exportación son mínimos, los micro-exportadores no están sujetos al efecto autoselección ni a la histéresis de exportación. Por consiguiente, la tesis propone que no hay diferencias de productividad entre los nuevos micro-exportadores y los no exportadores antes de entrar al mercado internacional y presenta la hipótesis de que los nuevos micro-exportadores no tienen niveles de productividad más altos en comparación con los no exportadores antes de empezar a exportar.

H2: Los nuevos micro-exportadores no tienen niveles de productividad más altos que los no exportadores antes de empezar a exportar

Con datos panel no balanceados de empresas industriales españolas para el periodo 1990-2015, la tesis cuestiona la existencia del efecto autoselección entre los micro-exportadores al apoyar la anterior hipótesis con análisis descriptivos (media incondicional), pruebas de regresión (media condicional) y pruebas no paramétricas (análisis de distribución). Además, en la tesis se examinan datos adicionales sobre el acceso a la exportación que apoyan la idea de que los micro-exportadores exportan productos existentes sin adaptaciones, a mercados gravitacionales, a través de distribuidores internacionales (o sirviendo pedidos directos de clientes extranjeros) con mayor frecuencia que los grandes exportadores.

Los resultados obtenidos muestran que los micro-exportadores no tienen mejores características de rendimiento y, específicamente, no tienen mejor productividad laboral que los no exportadores antes de empezar a exportar, contradiciendo la existencia del efecto autoselección para este grupo de exportadores. El marco conceptual de acceso a la exportación para los micro-exportadores complementa los últimos avances en la literatura de la Nueva Nueva Teoría de Comercio. Por ejemplo, la nueva dinámica de exportación, en la que los nuevos exportadores suelen empezar por exportar pequeñas cantidades que suelen consistir de un producto a un país, incurriendo en pequeños costes de entrada a la exportación y, condicionado a que continúe la actividad exportadora, aumentan gradualmente la cantidad exportada y el coste de entrada asociado a la exportación (Albornoz et al., 2012; Eslava et al., 2015; Ruhl y Willis, 2017). Sin embargo, el análisis realizado sobre el efecto autoselección en los micro-exportadores no está exento de limitaciones, ya que la muestra de empresas empleada para realizar los test sólo incluye un país (España) y sólo el sector industrial, y la base de datos no proporciona información detallada sobre las estrategias de entrada a la exportaciones seguidas por los nuevos exportadores.

Las implicaciones de la falta de un efecto autoselección entre los micro-exportadores significa que (casi) todas las empresas pueden acceder al mercado internacional si seleccionan las estrategias de entrada a la exportación apropiadas, pero (la mayoría) con pocas posibilidades de supervivencia. Al respecto, el marco conceptual propuesto para el acceso al mercado de exportación ofrece a los gestores y propietarios de pequeñas empresas información sobre las causas y consecuencias de algunas decisiones de entrada en el mercado de exportación que pueden tener en cuenta a la hora de seleccionar sus propias estrategias de entrada al mercado internacional. Dado que el coste de acceso a la exportación ya no es un impedimento importante para empezar a exportar, la estrategia de internacionalización de las pequeñas empresas debería cambiar su enfoque desde cómo entrar al mercado de exportación hacia cómo beneficiarse de la actividad exportadora. Si los gerentes y propietarios no están seguros de cuáles son las ganancias potenciales de la actividad exportadora, tal vez sea mejor no invertir sus escasos recursos para aventurarse en el mercado internacional donde, muy probablemente, la empresa pronto será expulsada debido a su falta de competitividad.

Conceptualmente, los programas de promoción a la exportación tradicionales facilitan la entrada a la exportación de las pequeñas empresas al reducir sus costes hundidos/fijos de exportación a través de los servicios de una agencia de promoción de exportaciones que centraliza ciertos costes de entrada a la exportación y los distribuye entre muchas empresas, que de otro modo no podrían recuperar el coste de entrada a la exportación (Fernández y Nieto, 2005; Leonidou et al., 2015; Much y Schaur, 2018). Sin embargo, el marco conceptual de acceso a la exportación no apoya un enfoque determinista del coste de entrada a la exportación, debido a que el coste de acceso es endógeno a la estrategia de entrada a la exportación de la empresa, basada en sus capacidades y recursos internos. Por lo tanto, la existencia de costes de entrada a la exportación ya no es una respuesta válida a la pregunta de por qué algunas empresas exportan y otras no. Los programas de promoción a la exportación deberían reorientarse de facilitar el acceso al mercado de exportación, que ya no es considerado un obstáculo mayor, hacia facilitar que las empresas obtengan beneficios de la actividad exportadora. Los programas de promoción a la exportación deberían pasar de subvencionar únicamente el coste de entrada a la exportación a facilitar el crecimiento de la productividad y la demanda externa de los pequeños exportadores, con el fin de que las pequeñas empresas puedan competir eficazmente en el mercado de exportación.

Para finalizar, el análisis del efecto autoselección en los micro-exportadores abre la puerta a nuevas investigaciones en varias direcciones. Entre ellas podría incluirse el estudio del marco conceptual de acceso a la exportación de los micro-exportadores de países distintos a España y de sectores productivos distintos al industrial, incluido el uso de casos de estudio sobre los micro-exportadores para comprender mejor las causas y consecuencias de las estrategias empleadas por las pequeñas empresas para acceder al mercado internacional.

3. El efecto aprendizaje por exportación

Adicionalmente al efecto autoselección, para explicar la prima del exportador, la literatura de la Nueva Nueva Teoría de Comercio propone la existencia de un efecto aprendizaje por exportación por el cual las empresas mejoran su productividad tras ingresar al mercado internacional, impulsada por un proceso de aprendizaje sobre innovación, gestión, producción, calidad y tecnología estimulado por la interacción con clientes y competidores internacionales. Sin embargo, aún no hay consenso sobre la existencia del efecto aprendizaje por exportación, ya que parece estar presente sólo en algunos países, en algunas industrias y en algunas empresas (Wagner 2007; ISGEP, 2008; Martins y Yang, 2009; Wagner, 2012).

Para evitar cualquier controversia en torno a la existencia del efecto aprendizaje por exportación, esta tesis propone un marco conceptual de acceso a la exportación en el que las pequeñas empresas con baja productividad y escasos recursos entran al mercado internacional mediante la selección de estrategias de acceso a la exportación que reducen el costo de entrada a la exportación a un nivel insignificante pero que limitan severamente el volumen exportado, convirtiéndose en micro-exportadores. Además, dadas las estrategias de acceso a la exportación seguidas por los nuevos micro-exportadores, no obtienen ganancias de productividad significativas derivadas del efecto aprendizaje por exportación ya que no comprometen suficiente personal, tiempo y otros recursos internos para aprender de los mercados internacionales, asimilar el conocimiento y ponerlo en práctica a través de la adopción de nuevos productos, tecnologías y habilidades que a su vez producen un efecto positivo sobre la productividad de las empresas (Clerides et al., 1998, Manjón et al., 2013). La ausencia de efectos positivos del efecto aprendizaje por exportación en la productividad y el insignificante coste de entrada al mercado de exportación logrado por los micro-exportadores imposibilita la histéresis de exportación y explica la falta de competitividad en el mercado internacional, la corta vida del emprendimiento internacional y la baja persistencia de los micro-exportadores que experimentan una alta rotación de entrada y salida al mercado de exportación (Roberts y Tybout, 1997).

Debido al hecho de que los micro-exportadores no pueden disfrutar de aumentos significativos de productividad derivados del efecto aprendizaje por exportación a través de su actividad exportadora, la tesis sostiene que no hay diferencias en el crecimiento de la productividad entre los nuevos micro-exportadores y los no exportadores tras la entrada al mercado internacional. Proponiendo por ello la hipótesis de que los nuevos micro-exportadores no experimentan un mayor crecimiento de la productividad que los no exportadores tras empezar a exportar.

H3: Los nuevos micro-exportadores no experimentan un aumento de productividad superior al de los no exportadores tras empezar a exportar

Con datos panel no balanceados de más de 1,800 empresas industriales españolas al año para el periodo 1990-2015, la tesis cuestiona la existencia del efecto aprendizaje por exportación entre los micro-exportadores al apoyar la anterior hipótesis con análisis descriptivos (media incondicional), pruebas de regresión (media condicional) y pruebas no paramétricas (análisis de distribución). Además, la tesis estudia datos adicionales de las empresas exportadoras que sustentan el marco conceptual de acceso a la exportación, en el que los micro-exportadores experimentan niveles muy bajos de intensidad y persistencia en la exportación, así como recurrentes entradas y salidas al mercado internacional sin histéresis de exportación.

Los resultados están alineados con la propuesta de que empezar a exportar no aumenta la productividad de los nuevos micro-exportadores, contradiciendo la existencia del efecto aprendizaje por exportación para este grupo de exportadores. El marco conceptual y los resultados obtenidos no contradicen hallazgos anteriores de la literatura de la Nueva Nueva Teoría de Comercio, ya que todavía se debate acaloradamente si existe el efecto aprendizaje por exportación y, en caso afirmativo, cuáles son sus causas y consecuencias. Por el contrario, ayuda a aclarar la ausencia del efecto aprendizaje por exportación entre los micro-exportadores. Sin embargo, el análisis realizado sobre el efecto aprendizaje por exportación en los micro-exportadores no está exento de limitaciones, ya que la muestra de empresas sólo incluye un país (España) y sólo incluye el sector industrial.

La ausencia de un efecto aprendizaje por exportación entre los micro-exportadores implica que la exportación no es una palanca de riqueza o productividad en sí misma, sino una de las muchas actividades que pueden apoyar la estrategia de crecimiento de una empresa. La exportación abre un nuevo mercado potencialmente inmenso para explotar economías de escala, acelerar el proceso de aprendizaje y acceder a nuevos conocimientos, tecnologías e ideas que aún no están disponibles a nivel nacional. La exportación es sólo un medio para alcanzar un fin y no un fin en sí mismo. Por todo ello, los propietarios y gerentes de las pequeñas empresas deben analizar cuidadosamente si desviar sus escasos recursos hacia la actividad exportadora se articula con la estrategia de la empresa para capitalizar el efecto aprendizaje por exportación a través de estrategias de crecimiento bien definidas. Si los micro-exportadores no pueden hacerlo, están condenados a realizar exportaciones como una actividad marginal en el futuro al ser expulsados anticipadamente del mercado internacional debido a su falta de competitividad, con un comportamiento exportador irregular fácilmente reversible que no les permite obtener beneficios significativos de la actividad exportadora. En otras palabras, si las pequeñas empresas no pueden beneficiarse de manera significativa de competir en el mercado internacional, en última instancia se verán apartadas por la globalización.

Si la actividad exportadora de los micro-exportadores no puede mejorar directamente su productividad o su demanda, es probable que estas pequeñas empresas salgan pronto del mercado de exportación sin obtener beneficios significativos de su actividad exportadora. Debido a esto, los programas de promoción a la exportación deben reorientar sus proyectos de asistencia hacia el aumento de la productividad de las empresas a través del apoyo a la innovación y el desarrollo y la formación del personal. Al promover directamente la productividad, los programas de promoción a la exportación facilitan indirectamente el acceso a la exportación, ya que las empresas más productivas pueden absorber mayores costes de entrada a la exportación, y aumentan la capacidad de los nuevos exportadores para competir con éxito en el mercado internacional (Görg et al., 2008), alcanzando la experiencia de exportación necesaria para obtener beneficios significativos del efecto aprendizaje por exportación, así como desarrollar la capacidad de absorción necesaria para adquirir y aplicar los nuevos conocimientos y la nueva tecnología del mercado internacional a fin de aumentar su productividad.

En conclusión, el análisis del efecto de aprendizaje por exportación en los micro-exportadores abre la puerta a nuevas investigaciones en varias direcciones. Por ejemplo, estudiar el marco conceptual para los micro-exportadores en distintos países a España y en distintos sectores productivos al industrial, incluido el uso de casos de estudio sobre los micro-exportadores para comprender mejor su dinámica de exportación.

A modo de conclusión, es posible que durante la fase de entrada a la exportación una empresa descubra una oportunidad de negocio en el mercado internacional y complete el pedido, convirtiéndose en un exportador. Sin embargo, un período de tiempo considerable (quizás más de 12 meses) transcurre entre pedidos, pero la empresa está totalmente preparada para responder a otro pedido internacional cuando y como se presente de nuevo. Estos casos son difíciles de clasificar (Welch y Welch, 2009) porque la empresa es, sin duda, una empresa nacional con espíritu internacional que se convierte en exportadora en diferentes momentos de tiempo. Esto puede sugerir que para un número significativo de empresas, especialmente pequeñas y medianas empresas con baja productividad y pocos recursos, el proceso de internacionalización continuo y gradual, si bien no es incompatible con sus estrategias de exportación, simplemente no ocurre.

Debido a esto, la división tradicional de empresas en dos grupos dicotómicos de exportadores versus no exportadores podría ser conceptualmente insuficiente para clasificar a estas pequeñas empresas que habitan una zona gris entre las dos categorías, en las que es común la exportación oportunista, intermitente o incluso accidental (Bernini et al., 2016). Tal vez la categorización de los micro-exportadores sea un primer paso en la dirección correcta.

En resumen, la tesis amplía la actual literatura de la Nueva Nueva Teoría de Comercio al incorporar la dinámica exportadora de un grupo de exportadores desatendidos, los micro-exportadores, que cada año representan una mayoría de empresas exportadoras en muchos países y demuestra la gran importancia de los micro-exportadores, ya que, al menos durante la última década en España, representan más de la mitad de todos los exportadores con una creciente presencia entre la comunidad exportadora. Por lo tanto, investigaciones adicionales sobre este desatendido grupo de exportadores están ampliamente justificadas y, sin duda, son necesarias.

El primer paso para hacer frente a la pobreza fue reconocer el principio de desigualdad de ingresos de Pareto con el fin de poder estudiar la base de la pirámide, los miles de millones de personas que viven en la pobreza extrema. Ahora, es el momento perfecto para abrazar el principio de la desigualdad de la exportación para estudiar la base de una pirámide diferente, los millones de micro-exportadores, para la reconstrucción... que descansa sobre los olvidados.

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